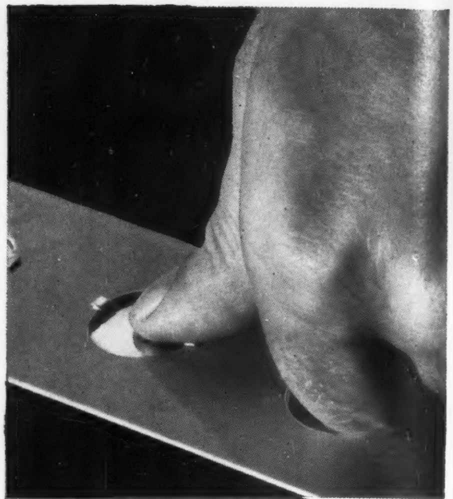
# Light and LIGHTING

# *These Knockouts are a pushover...*



**. . . but all these points**

**are equally important**

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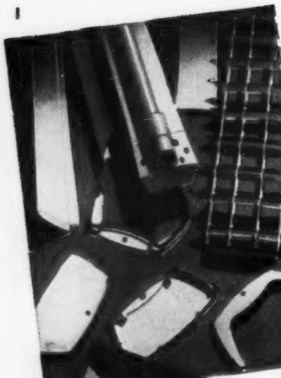

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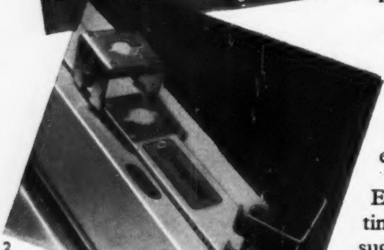

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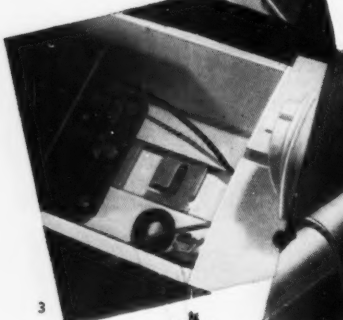

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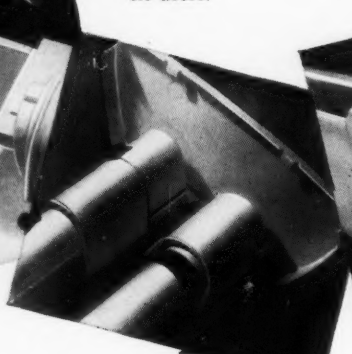

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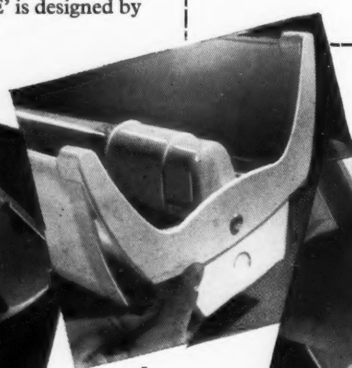

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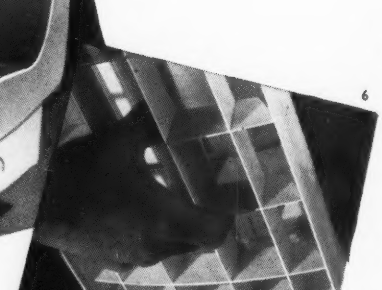

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ELECTRICAL EQUIPMENT

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# Light and LIGHTING

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## contents



# Lighting Cinemas

LIGHTING is a matter of art as well as of science, and this truth is clearly manifest when the lighting of cinemas is considered. What are the requirements to be satisfied? First, the exterior of the cinema needs to be lighted, either spectacularly or at least attractively, and here artistry in design is highly desirable: when this is lacking the result achieved can be blatant and vulgar. Then the foyer calls for artistic and pleasing lighting, but here design should aim to achieve a general luminance gradient towards the auditorium. Restaurant and car-park lighting may also be needed. In the auditorium, decorative lighting in one of its many variants is usual and desirable, but it must be readily controllable by dimming and switching. While films are being shown the auditorium lighting then in use must make no appreciable contribution to the luminance of the screen. The screen lighting sources are, of course, special pieces of lighting equipment which are the very heart of the cinema; their characteristics and performance need to be as good as possible. There is also a Statutory Instrument requiring the maintenance of "safety lighting" in all parts of the premises to which the public are admitted, and this lighting must be designed to remain in operation on the failure of the ordinary lighting.

# Notes and News

NOTICE of the meeting at which the revised constitution of the IES and the proposal to adopt the name " The Lighting Society " has been sent to all IES members together with a letter from the President explaining what it is all about. Views for and against the recommended new name have been expressed, and it is hoped that members will make up their own minds on this subject and record their votes accordingly. We would, however, repeat what we said last month that the name should not be confused with the changes in the constitution and that however violent members' feelings may be on the former they will support the resolutions on the latter so that the Society may be put on a sound basis for the future whatever its name may be.

## *The Trotter-Paterson Lecture*

As the then President of the Illuminating Engineering Society, Mr. A. G. Higgins, said at Harrogate last year, members of that Society may well feel highly honoured when they look at the list of those who have delivered the Trotter-Paterson Memorial Lecture. Of the four names now on that list, two are those of Nobel prizewinners and it was one of these two, Sir Lawrence Bragg, who gave this year's lecture at the Royal Institution on February 11. He chose as his subject " The Interference of Waves " and began by saying that instead of delivering a formal lecture, he proposed to show a number of demonstrations illustrating the interference of waves of different kinds and its production by different means.

It was Thomas Young who, in 1801, described the first experiment on interference. When light from a single pinhole passed through two pinholes side by side in an opaque sheet, a pattern of light and dark fringes was observed on a surface placed in the path of the light emerging from these two pinholes; this was interpreted by Young as a demonstration of the wave character of light. A reproduction of Young's ripple-tank experiment, showing the interference of ripples on the surface of water, was then thrown on the screen.

Next the lecturer passed to the interference of sound waves. By means of a long row of metal slats, suitably linked together, he demonstrated how " standing waves " were produced when a train of waves was reflected, so that interference occurred between the outgoing waves and those returning on the same path. Then, using a small loud-speaker as source, he showed that the same phenomenon occurred with sound waves, a sensitive flame indicating clearly how the intensity of the sound varied on passing along a row of standing waves.

The next kind of wave to be considered was the " radio wave." The source was a klystron emitting waves about one-third of an inch in length and with this the lecturer demonstrated several of the phenomena normally associated with light. He showed that a plate of paraffin wax, a good insulator, readily transmitted the waves, although there was a certain amount of absorption. When the plate was placed so that it half-covered the beam, " fringes " were produced by interference between the waves which passed through the plate and those which did not. A concave metal mirror and a convex lens both brought the waves to a focus, just as in the case of light, while a prism of paraffin wax refracted them. A different focusing device was the " wave-guide " consisting of a concave plate made up of short lengths of metal tube placed side by side.

Sir Lawrence then turned to the subject on which he and his father, Sir William Bragg, worked together with such remarkable results. By studying the patterns formed by the interference of X-rays when these passed through a crystal, they were able to deduce the molecular structure of the crystal. The basic principle was exactly analogous to that of the interference of light waves passing through a thin parallel plate. If the surfaces of such a plate are made partially reflecting, the light which emerges after passing once through the plate interferes with that which has suffered two reflections at the internal surfaces and so emerges only after a triple passage. The wave-length for which this interference is maximal is related to the thickness of the plate by a very simple formula. In a similar manner when X-rays show interference after passing through a crystal there is a simple relation between their wave-length and the distance between the crystal planes.

The application of this principle to the three-dimensional problem of the crystal, in which there may be a number of sets of parallel planes oriented in different directions, is a matter of considerable complexity and the lecturer was only able to touch on this rather briefly and to show an ingenious piece of apparatus used in the work.

A vote of thanks was proposed by Dr. W. S. Stiles and seconded by Dr. J. N. Aldington.

The audience in the well-filled lecture theatre included Mrs. Trotter and Lady Paterson and members of their families.

## Furniture

Those who are concerned with the lighting of building interiors should be interested in the furnishings that go into them, and we hope that many of you had a look at the recent Furniture Exhibition at Earls Court. If you didn't then we suggest you make a note to try to get to it next year if only for the reason that this year's show included about the best selection of contemporary lighting fittings that we have yet seen under one roof. (There were also some horrors, but they were mainly confined to the trade section which fortunately was not open to the public.) Light did in fact play a very prominent part in this exhibition, the central feature of which was a "cascade of light" designed by Misha Black. This

was suspended from ceiling to floor in the centre of the main hall and was made up of over 120 Forrest Modern glass fittings. Light has obviously entered the furnishing world in a big way due to no small extent to the work of the designers of lighting fittings who in the last few years have put this country into the lead as far as decorative lighting fittings are concerned.

## Electric Lamp Industry Council

In view of the changed conditions now ruling in industry the members of the Electric Lamp Manufacturers' Association have decided to dissolve the association which, therefore, ceased to exist as from February 28. The Lighting Service Bureau will, however, continue.

A new body, to be called the Electric Lamp Industry Council, is being formed by a number of British firms whose lamp factories are licensed by the British Standards Institution, the objects of which will be to maintain high standards of quality, to encourage fair trading and to promote, develop and safeguard the interests of all who make, buy, sell or use electric lamps in the United Kingdom. The new Council will have no jurisdiction in respect of list prices, which will be determined by individual manufacturers.

In addition to providing facilities for consultation between its member firms the Council will represent the electric lamp industry in negotiations with Government and other official bodies. Founder members include Aurora Lamps Ltd., A.E.I. Lamp and Lighting Co. Ltd., British Electric Lamps Ltd., Crompton Parkinson Ltd., Cryselco Ltd., Ekco-Ensign Electric Ltd., The General Electric Co. Ltd., Philips Electrical Ltd., Pope's Electric Lamp Co. Ltd., Siemens Bros. and Co. Ltd., Stella Lamp Co. Ltd., and Thorn Electrical Industries Ltd.

The Council will begin operations this month. Its first chairman is Mr. J. G. Christopher. The secretary is E. J. Counter, and the offices of the Council will be at Newnham House, 13, Bloomsbury Square, London, W.C.1 (CHAncery 6462).

## IES Dinner

A number of people, not just IES members patting one another on the back, have from time to time remarked that the IES is a live and friendly society; when its proceedings should be formal and dignified they are; when the occasion is one for frivolity then frivolity is forthcoming and "shop" is banished. The Society's dinner and dance, whether held in London or elsewhere, is an annual occasion when all have a good time. This year the dinner and dance is to be held at the Café Royal on April 2. Notice has been sent to all IES members, but we gather that such was the form of the notice that many may have consigned it to the waste-paper basket under the impression that it was a coupon for a cheap packet of detergent (some IES members must be very well paid if they can in fact afford to throw 4d. into the w.p.b.). So if you have "mislaid" your notice then we remind you that the date is April 2, the price of tickets 2 gns., and that the IES secretary hopes you will join the party.

**A typical example of the interesting decorative effects that can be achieved in the modern cinema by well-designed lighting is provided by this cinema in Mannheim, Germany (architect, Paul Bode Kassel). The balcony balustrade is lit by cold-cathode lamps concealed by the coping. The walls are fabric covered and lit from above by tungsten lamps. (Photograph—Artur Pfau).**



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# CINEMA LIGHTING

Competition from television—and other factors—has led to a sharp decrease in cinema audiences and many cinemas in the United Kingdom have been or are being closed down. On the other hand, Wardour Street is planning a substantial number of new cinemas in the New Towns and other new centres of population, while, to attract the public back to the cinema, old premises are being renovated. Abroad, a great deal of cinema-building is taking place—in war-devastated Germany, for example, and in those countries where the cinema is only just beginning to replace indigenous forms of recreation. This 18-page survey of cinema lighting includes four articles by members of the well-known firm of architects, T. P. Bennett and Son, who have been responsible for the design of a large number of cinemas. It is illustrated by photographs of recent work in this field in the United Kingdom, Germany and other countries overseas.

## PART 1: Decorative Lighting of Auditoria and Foyers

**By W. Bonham Galloway, B.A., A.R.I.B.A.**

IN the early days of the cinema, auditoria were strongly influenced by the traditional designs of the theatre and opera house; there were exuberant and flamboyant furnishings and the screen was surrounded by a highly decorative picture frame separating it from the auditorium. The "grandeur" of the architecture often posed an insoluble acoustical problem by creating a high cubic content per seat, while the lighting was often elaborate and excessively expensive to maintain.

To-day, advances in the visual and audible aspects of film production demand a greater understanding of the technical problems involved in the efficient showing of films. The high cost of building and the heavy burden of maintenance have led to a simplification of design, bringing a new set of problems for the architect and the lighting engineer to solve. Faced with the necessity to use simple forms and plain surfaces, the designer finds that he must regard the lighting as the most important single factor in producing an architectural effect which will be agreeable and striking to the patrons of the cinema.

Broadly speaking, the methods of lighting cinema auditoria can be divided into three main categories:—

(1) Indirect lighting by means of tungsten lamps in troughs or fluorescent lamps in coves (Fig. 1; see also photograph on facing page).

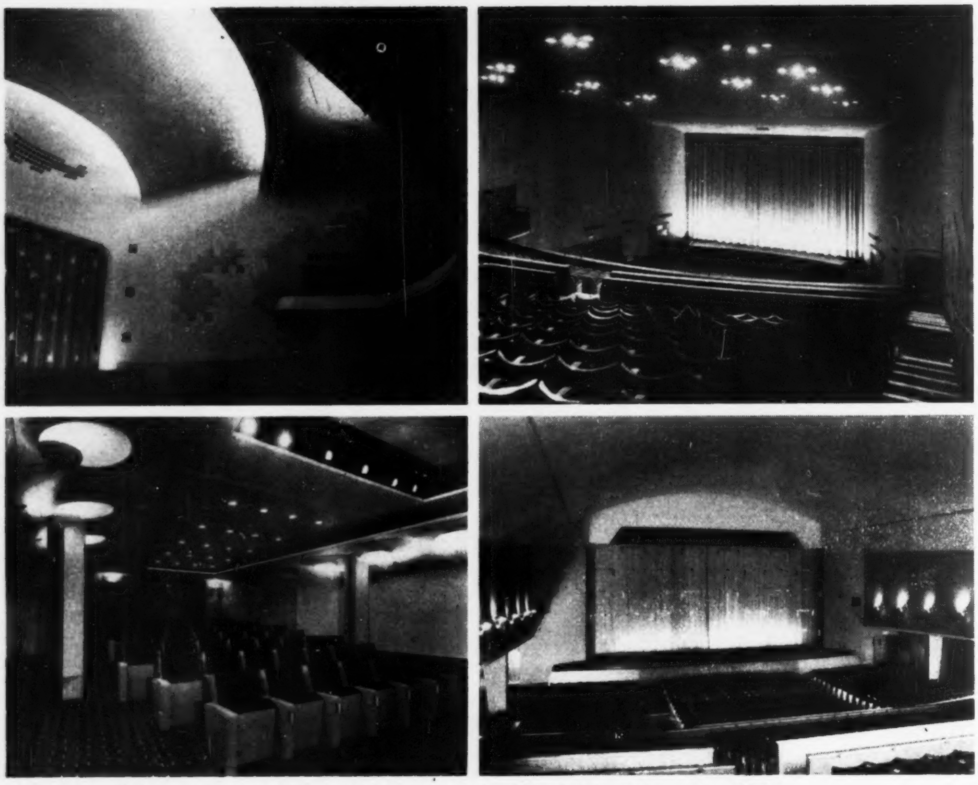
(2) Visible suspended lighting fittings (see Odeon, Sheffield, page 76).

(3) Direct lighting by means of recessed or semi-recessed fittings in the ceiling (Fig. 2).

In practice a combination of methods is very often used (see Ipiranga cinema, S. Paulo, page 90).

Indirect lighting may be said to produce the most pleasing effects: a softness of lighting is obtained which, when used with pale colours, gives a sense of comfort surpassing that given by other types of lighting. But indirect lighting is expensive to install and maintain—part of the cost being due to the extensive cat-walks in the roof void needed to facilitate relamping. Furthermore, the most efficient type of trough requires a very wide mouth, which, having regard to the constant need to limit the volume of the auditorium for acoustic reasons, is inclined to create appreciable additional cubic capacity.

The use of pale colours on the reflecting surfaces is a prerequisite of indirect lighting and there is a substantial risk of "back reflection" from the screen during the



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**Auditorium lighting: Fig. 1, indirect (Odeon, Jersey). Fig. 2, direct from downlights recessed into ceiling (Odeon, Highgate). Fig. 3, combination of indirect light from wall brackets and downlights (private viewing theatre, Wardour Street). Fig. 4, lighting by wall brackets (Gaumont, Bootle).**

showing of the film. This danger is increased by the need to keep the ceiling close to the " line of throw " of the projection beam in order to maintain the low cubic capacity referred to above. Evenness of lighting in indirect schemes can be achieved by using low-wattage lamps at frequent intervals—usually 40- or 60-watt lamps at 9-12 in. centres—but this militates against the efficiency of the lighting scheme and raises the consumption of electricity. Attempts to reduce consumption by using fluorescent lamps have so far had limited success, because of the difficulty in controlling the reflected light and the higher cost of dimmers for fluorescent lamps.

### Suspended Fittings

Visible fittings suspended from the ceiling are a more efficient source of light and are easier to maintain. They are usually suspended on cables attached to winches, so that re-lamping can be carried out from within the auditorium by lowering the fitting. However, the very wide angles subtended by the modern screen limit considerably the area in which fittings of this type can be suspended, especially as there should not be a large space between the ceiling and the line of the projection beam. There is, too, the danger of reflection and glitter during the showing of the film, which can be a distraction to the audience. The Statutory Authorities do not normally allow the use of plastics within the auditorium, hence restrictions are imposed on the design of the fittings, which must be composed of fairly small pieces of glass.

### Recessed Downlights

The third method of lighting—by direct downward acting recessed fittings—gives efficient lighting over the seating area and the gangways, but, when using this method, it is difficult to give adequate illumination to the walls, and other surfaces which, in order to reduce back reflection, are painted a darkish tone. There is also the danger that the surface into which the fittings are recessed will seem darker than it really is, making the ceiling appear unduly heavy. This effect can be partially overcome by using semi-recessed fittings, or fittings designed to allow pools of light to " spill " on the ceiling (Fig. 3).

Where overhead lighting is, for constructional reasons, impracticable, lighting from wall brackets has been used (see Fig. 4), but it has been found difficult to produce satisfactory effects with this method where the " throw " is long. Reflectors must be used to mask the brightness of the source and attention must be paid to the shape of the pools of light produced. Fittings must be fixed at a height which ensures that their adjustment cannot

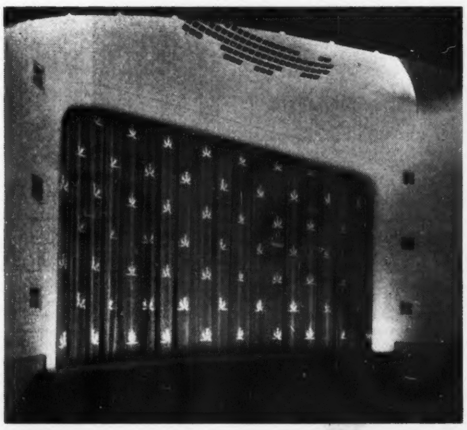
be interfered with by the public, and precautions must be taken to prevent accidental alteration of the alignment during cleaning.

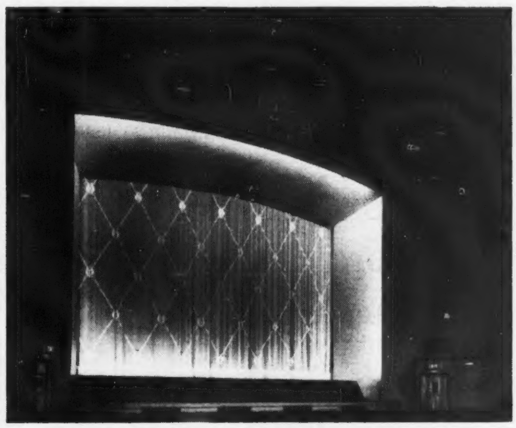
The decorative lighting of a cinema auditorium is usually designed to lead up to the proscenium, which can be regarded as the climax of the interior design. The increased width of the proscenium opening required for a wide screen produces an extensive area of curtains or tabs to be lighted. These curtains provide a dominating feature in which great richness of decoration can be produced without incurring disproportionate cost (Fig. 5). There can be little doubt that bottom lighting of the tabs produces the best effect. Side battens have sometimes been used, but the dual direction of the lighting largely cancels out the modelling of the drapes and, by this method, it is virtually impossible to light evenly the whole of a wide opening (Fig. 6). Top lighting is another possibility but is less pleasing in its effects than lighting from below alone (Fig. 7; see also Cinema Le Marivaux, Paris, page 89).

The Fire Authorities in London allow satin or glass silk enrichments to be applied to an inherently fire-resistant material, provided the former do not exceed 25 per cent. of the area of the curtain. Such decoration greatly enhances the background material and gives an interesting sparkle to the decorative scheme. A great variety of pleasing decorative effects can be produced without significant extra cost by carefully selecting the most suitable coloured gelatines for the float. Three colours are normally used and the best effects are produced by the ranges of reds, yellows and greens. It is surprising that management are loath to make more use of colour changes as a means of entertaining the audience during intervals.

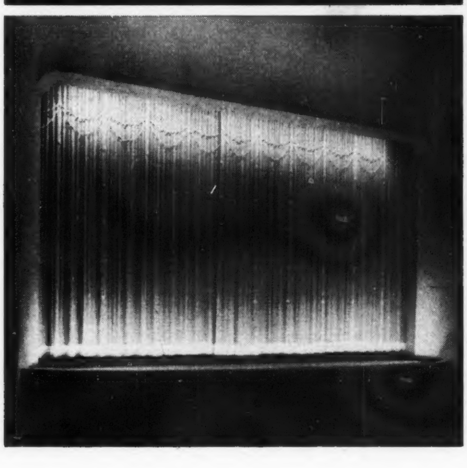
The principles of lighting cinema auditoria apply also to the foyers, except that maintenance usually presents a much simpler problem. It is usual to reduce the intensity of illumination as one approaches the auditorium, to assist the eyes in accustoming themselves to the subdued lighting within. The sales kiosk is usually an important element in the design of the foyer and needs a high level of illumination, preferably from a concealed source (Figs. 8 and 9). In the "front of house" areas generally, greater use can can be made of fluorescent lighting, since dimming is not required, while colours of higher reflective value can be used on floors and ceilings (see foyer of the Capitol-Lichtspiele, Dortmund, page 85).

**Lighting of curtains: Fig. 5, from below (Odeon, Jersey). Fig. 6, with side battens (Gaumont, Barnsley). Fig. 7, from above and below (Gaumont, Shepherds Bush). Kiosk lighting: Fig. 8, by fittings suspended above (Gaumont, Barnsley). Fig. 9, by downlights recessed into canopy (Gaumont, Shepherds Bush).**





**All the cinemas illustrating this article, except the Gaumont, Shepherds Bush, were designed by T. P. Bennett and Son.**



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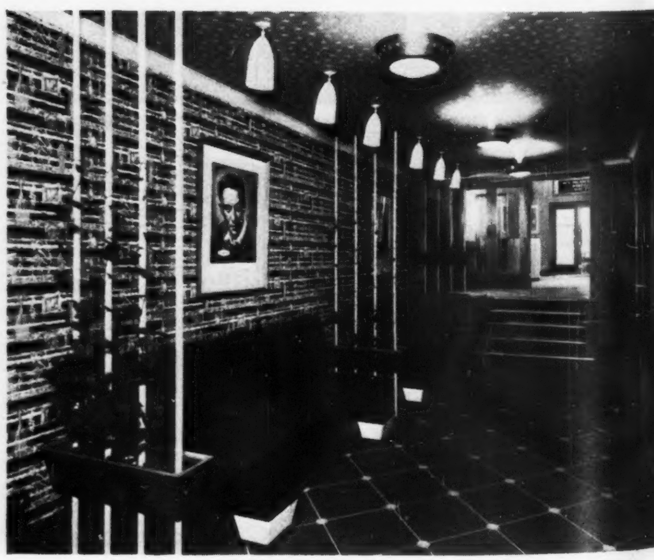
AUDITORIA.—Top: Odeon, Sheffield (architect, Harry W. Weedon and Partners). Decorative lighting by 27 suspended fittings, each comprising two aluminium spinnings, the larger being 30 in. in dia., the smaller housing a 100-watt tungsten lamp covered by a pink dished lens. Maintained lighting from 25-watt lamps in fittings recessed into ceiling. Left: Gaumont, Shepherds Bush (architects, Verity and Beverley). Decorative lighting to rear of stalls by reflected light from fibrous-plaster recesses in the balcony soffit. Suspended in each recess is a 5-in. dia. hemisphere housing a 60-watt pearl pink lamp. Maintained lighting by 25-watt lamps in fittings recessed into ceiling over gangways.

# RECENTLY COMPLETED BRITISH CINEMAS

## The Work of the Circuits Management Association, Ltd.

FOYERS.—Right and extreme right, Gaumont, Perth (architect, Gavin Paterson and Son), showing contrasting treatment of, respectively, the stalls and circle foyers. The former is lit by three semi-direct ceiling fittings housing 150-watt lamps. The perforated rim is anodised gold. The spotlights are of spun-aluminium painted white. The circle foyer is indirectly lit by fluorescent lamps concealed in the cornice. Maintained lighting is by anodised aluminium wall fittings, alternate shades being perforated.



**FOYER AND DISPLAY LIGHTING.—Odeon, Sheffield (architect, Harry W. Weedon and Partners). The main lighting is from one 12-light and two six-light pendant fittings. The white shades each house a 100-watt pearl lamp. The kiosk is lit by a row of spotlights with diabolo-shaped spun-aluminium shades. This fitting is used also to light displays of indoor plants and various publicity displays. (The two ceiling fittings seen top left are part of the lighting scheme of the circle foyer.)**

**CIRCLE FOYER. — Odeon, Westbourne Grove (architect, Leonard Allen, F.I.A.A.). Decorative lighting by three 12-light suspended fittings, with diabolo-shaped buckram shades, each housing two 40-watt pearl lamps, attached to an anodised aluminium ring. Maintained lighting is by wall fittings with matching shades. Extra light comes from five fibrous plaster domes lit by 100-watt lamps in fittings with a perforated aluminium rim and a cover of opal glass. Photographs of stars are lit by a row of spotlights with red and black spun-aluminium shades.**

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Photographs on these two pages, and of Rank Organisation cinemas on pages 74, 75 and 82, by permission of the Circuits Management Association Ltd., in conjunction with whose Engineering Department the lighting schemes were designed.

# PART 2: "Maintained" and Safety Lighting

By Morris L. Winslade, F.R.I.B.A.

LIGHTING in cinemas is governed to some extent by the regulations of the licensing authority which, in turn, are based on the Cinematograph (Safety) Regulations of 1955, though the particular licensing authority may, in fact, impose additional requirements. Essentially, these regulations require that there shall be two independent sources of supply for the lighting of a cinema, one for general lighting and one for "safety" lighting.

Although both services, as a rule, are supplied electrically, it is permissible for one of them to be gas, oil lamps (not mineral oil) or candles, subject obviously to suitabe precautions being taken, but if gas is used the same supply must not be used to drive an engine generating electricity for the other form of lighting.

Safety lighting—referred to formerly as "secondary maintained"—is that installation which, of itself and without screen illumination or other lighting, is sufficient for the public to make their way safely out of the building. It must be maintained during the whole time the public is in the building and in all parts to which it has access.

The general lighting of the cinema is divided conveniently into decorative and management lighting, the former, as its name implies, is essentially part of the decorative scheme and is used only for short periods at the beginning and the end of the show and during intervals. Management lighting, on the other hand, formerly known as "maintained primary," is provided to assist in the supervision of the premises and to ensure the easy movement of members of the audience within the premises. Management lighting is normally maintained during the whole performance and, together with the safety lighting, constitutes the "maintained lighting."

### Visual Adaptation Period

The Code of Practice, 1955, issued under the authority of the Council for Codes of Practice of the British Standards Institution gives certain recommendations for the level of illumination of safety lighting in auditoria. These recommendations are based on a visual adaptation period not exceeding 10 seconds. This is the period which a person, after having viewed the screen picture for at least five minutes, requires to adapt his eyes to the level of illumination provided by the safety lighting.

It is found by test that this visual adaptation period of 10 seconds can be achieved by average members of the public if the level of illumination of the safety lighting is of the order of 0.001-0.0025 $lm/ft^2$, but it will be appreciated that the reflection factors and colours of the walls, seats and carpets have a substantial effect on the adequacy of any system of installed safety lighting. Dark walls, floor coverings and seating will require a higher illumination level than lighter tones, but when seats and carpets are in colours that contrast with the colours of the walls, the level of illumination may be less.

Generally, the safety lighting should increase in intensity as one passes from the auditorium to the exit stairs and passageways, and out to the street. However, as the whole purpose of safety lighting is to ensure safe egress by the public in an emergency, changes in floor level or in direction in the exit gangways and the presence of seating projecting unexpectedly into the gangways require special consideration and may need a higher level of illumination.

The visual adaptation period varies with the difference of intensity between the illuminated screen or stage show and the level of the safety lighting. Where stage shows form part of the entertainment, the full stage lighting may well be brighter than the normal screen picture; thus, the period of visual adaptation must be increased and a higher level of safety lighting is needed.

### Safety Lighting Methods

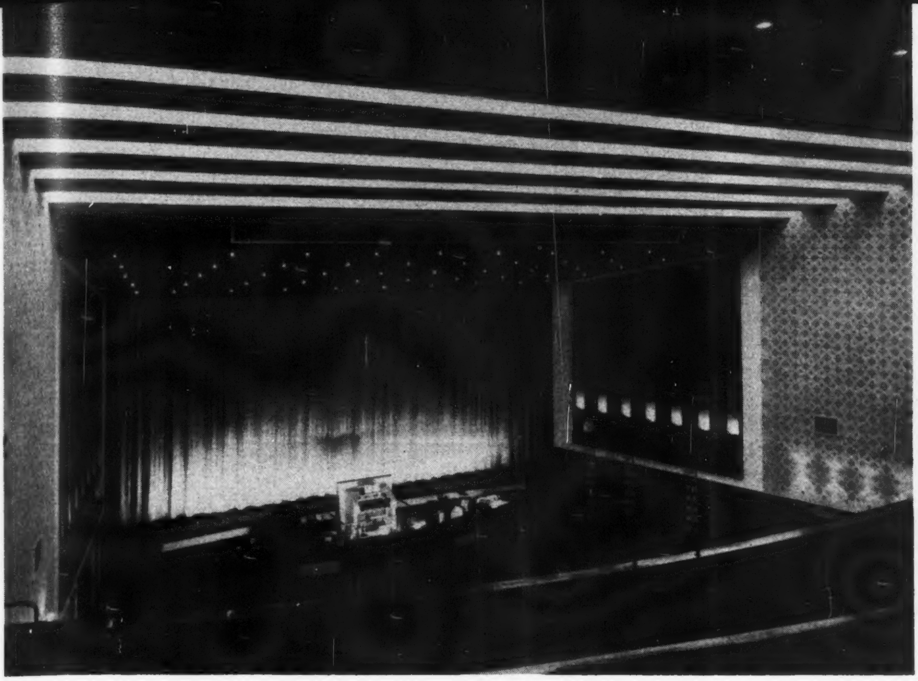
The positioning and direction of safety lighting must be such that the minimum interference is caused to the broad field of view of the audience looking towards the screen and, similarly, glare from such lighting points must be avoided when the spectator is making his way out of the theatre. Probably the best and most practical form of safety lighting (and indeed for management lighting) within the auditorium is by conical fittings recessed into the ceilings which fulfil all requirements in that they can be "angled"; they hide the source of light and offer the least possible distraction to viewers.

The lighting can be provided by indirect light, but this necessitates a higher installed wattage and higher maintenance costs. Moreover, indirect lighting, because it depends on reflection, produces illuminated areas on walls and ceilings which may prove disturbing to the audience.

Bracket lighting can sometimes be used for safety lighting, but the fittings are more liable to interfere with the audience's field of view and even lighting without patchiness is difficult to achieve. Seat lighting—i.e., louvred light fittings on the seat standards next to the gangways—is also, in certain districts, acceptable. If carefully designed and installed, it can be useful for lighting the steps and gangways, but the lighting is largely obliterated when, under emergency conditions, the entire audience crowds into the gangways. Moreover, bright patches of light on the floor and on the seat standards are apt to be distracting to the audience, particularly those seated near to them.

Safety lighting outside the auditorium must provide a higher level of illumination—at least 0.05, and preferably 0.1 $lm/ft^2$. Alternate light and dark areas should be avoided and staircases must be given special consideration.

Safety lighting, if supplied by electricity, would normally be fed from electric storage batteries and should, for reasons of economy, be kept to the lowest



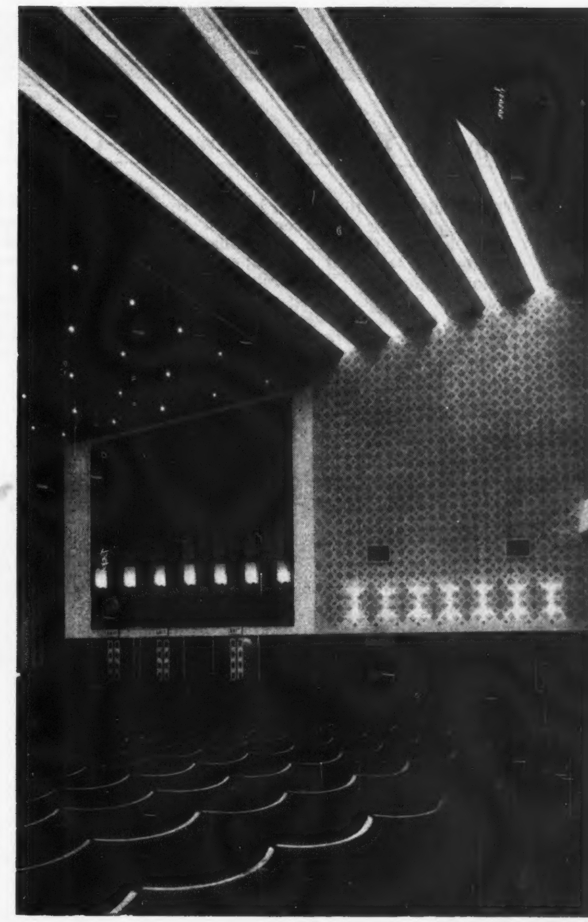
The auditorium, as seen from the balcony. The main lighting is from bands of de luxe warm white cold-cathode tubing concealed behind perforated metal baffles. Immediately in front of the stage is an area of "night sky"—a dark blue suspended ceiling through holes in which the bulbs of naked tungsten lamps slightly project. The balcony is lit by 9-in. dia. downlights recessed into the ceiling.

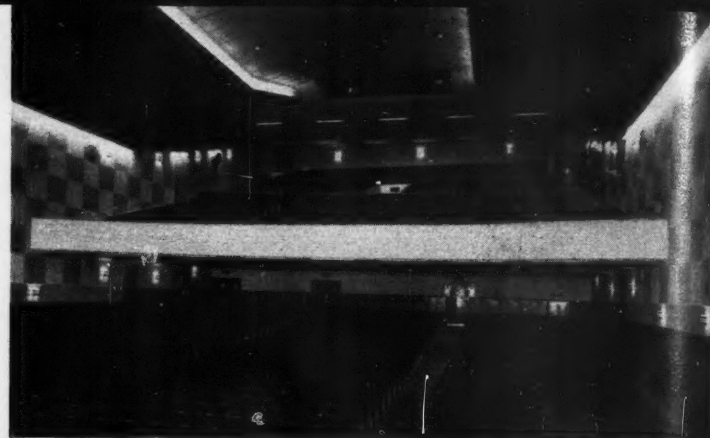
# RECENTLY COMPLETED BRITISH CINEMAS

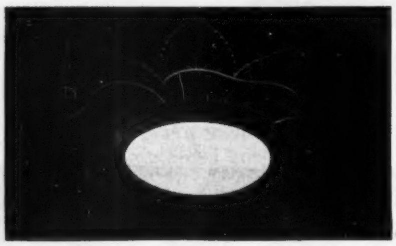
## The Cecil, Hull (Architects, Gelder and Kitchen)

The auditorium, as seen from the stalls. Supplementary lighting comes from diabolo-shaped wall brackets mounted on the acoustic panelling and from spotlights with spun metal shades which light alternate recesses of the organ grille. Secondary lighting is from $4\frac{1}{2}$-in. dia. downlights recessed into the ceiling and housing 15-watt tungsten lamps.


The foyer. General lighting is from circular fittings recessed into the ceiling and from three-light pendant fittings. Extra light comes from diabolo-shaped wall brackets similar to those used in the auditorium. These fittings, in groups of six, are mounted around the columns seen in the background of this photograph.

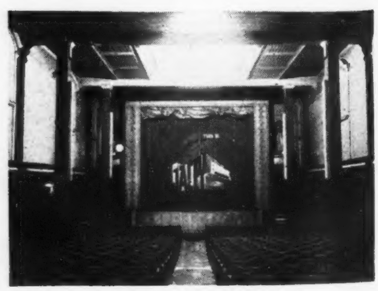






## Apollo Cinema, Newcastle-Upon-Tyne (Architect, Pascal J. Stienlet and Son)

**The auditorium (top right) is lit by two vertically glazed lighting troughs housing 80-watt fluorescent lamps. Similar lamps, concealed behind egg-crate louvres, light the side walls. Additional light comes from 23 wall lights (top left) and 12 semi-recessed ceiling fittings provide the maintained lighting. The circle foyer (above right) is lit by four fittings recessed into the ceiling and covered by eggcrate louvres. Each fitting houses two 80-watt fluorescent lamps and one 25-watt emergency lamp. Extra light comes from 100-watt tungsten lamps in six fittings fixed close to the ceiling and from six suspended "Tudor Rose" fittings (see close-up), each lit by two 3-ft. dia. circular fluorescent lamps.**



## Cinephone, Manchester (Architect, J. Seymour Harris and Partners)

**This very old cinema (see photograph above) was recently completely renovated and converted into a cinema for Continental films. It is now lit indirectly by lamps concealed by the folds of the undulating ceiling and by "spilt" light from the side aisles. The balcony is lit by downlights recessed into the ceiling.**

acceptable level. It may be arranged either to be switched on automatically in the event of current failure of the main electrical supply, or permanently connected, whenever the public is in the building, to a battery which is "floated" across the main electricity supply through charging equipment. In either case, the conduit and wiring for safety lighting must be installed separately from any other system.

Management lighting, like safety lighting, should, in general, decrease in intensity from the outer foyer to the auditorium. Within the auditorium it should decrease towards the screen. Its purpose in practice is to give, with the safety lighting, sufficient light for satisfactory control of the audience and it is usually assisted by the light from the screen.

### Illumination Levels

Inside the auditorium an illumination level of about 0.005 $lm/ft^2$ is generally found satisfactory, but, as with safety lighting, this varies according to the colour and texture of the walls, the seating, etc., and may well need to be higher when dark colours are used or, under special circumstances as in newsreel cinemas, where a continual movement of the public is likely to take place, and more lighting during performances is advisable.

Management lighting in the auditorium can be provided by selected fittings of the decorative lighting scheme, "dimmed" during performances, but as this necessitates these particular lighting circuits being "on check" during the whole of the performance, this method cannot be considered economically sound.

Management lighting outside the auditorium often forms the whole of the lighting installed in public foyers, staircases and corridors, apart from the safety lighting, but consideration may well be given in certain cinemas to a reduced amount of management lighting in the "front of the house," where daylight is normally available, or where the full lighting is not required for publicity purposes. Under these circumstances, as in the auditorium, the general lighting to the front of the house may be subdivided between management lighting, always maintained, and decorative lighting, which would be used during the entry and exit of the public and at other specific times.

### Staircases and Corridors

On staircases and corridors it is convenient to install fittings having safety and management lighting circuits in the one fitting, the two circuits being suitably segregated and, of course, separately tubed and wired. Alternatively, the two fittings can be provided adjacent to each other. In either arrangement proper visibility of steps and corridors is maintained, whichever system is in operation.

Exit signs, which are part of the "maintained" installation, are usually installed with both safety and management lighting circuits, the lamp on either circuit being fitted in such a way that it will give an even illumination to the lettering, though usually both are kept alight during performances. The lettering must be designed so as to be easily readable from a distance of 80 ft. when internally illuminated. If gas is used for one system of lighting it is best fitted as a bracket above the exit sign to avoid damage to the internal electrical fittings.

Exit and other "maintained" signs must follow the general rule of being placed and designed so that they avoid glare and interfere as little as possible with the comfortable viewing of the picture.

# PART 3: External Lighting

By Morris L. Winslade, F.R.I.B.A.

THE exterior lighting of cinemas, apart from a limited amount of general lighting to enable the public to enter and leave the building, is wholly for publicity purposes. It may be provided, however, by a suitable combination of :—

(a) the canopy, soffit and fascia lighting;
(b) the name sign;
(c) neon outlining;
(d) poster frame lighting;
(e) interchangeable signs;
(f) floodlighting.

While outlining, illuminated signs, etc., are intended to draw the public from afar, canopy lighting is essentially an invitation to enter. The soffit, therefore, requires a high intensity of illumination and this may be accomplished in a number of ways—by recessed soffits, by indirect lighting or, as is more usual to-day, by groups of mirror-backed tungsten lamps or of gas-discharge lamps.

The cinema name sign is sometimes incorporated in the facing materials of the building, but more often separate signs are attached to the structure, with superimposed neon outlining with one, two or three lines of tubes, depending on the size of sign. Alternatively, internally illuminated signs can be used.

Outlining with neon tubes of varying colours can emphasise the architectural effects of the building, but it must not compete with the essential lighting to the entrance; it should be designed to lead into it.

Poster frames, giving the current and future programmes, can be illuminated either internally—by strip lights in a suitably recessed frame—or by spots hung from the canopy soffit. The latter method gives a flatter angle of incidence and produces a more brilliant effect, but care must be taken to guard against disturbing reflections.

Publicity for the current programme can, in suitable circumstances, be provided by interchangeable signs either on the fascia of the canopy or as a separate structure incorporated in the elevation of the building itself. The canopy fascia may be of box formation, with flashed opal

or other obscured glass (illuminated internally), on the front of which metal letters are hung to show up dark against the lighted background. This method, however, allows only a restricted space for programme details, whereas a separate interchangeable sign can be designed to give as much space as is considered necessary. This requires a reasonable recess in which to install lighting, the source of which should be obscured so as to produce even illumination over the whole of the sign. The front of the feature should be in some form of opaque glass, or "Perspex" where permitted, supported by the thinnest of framing members so as not to obstruct the view or render illegible the lettering which is hung on the face of the sign.

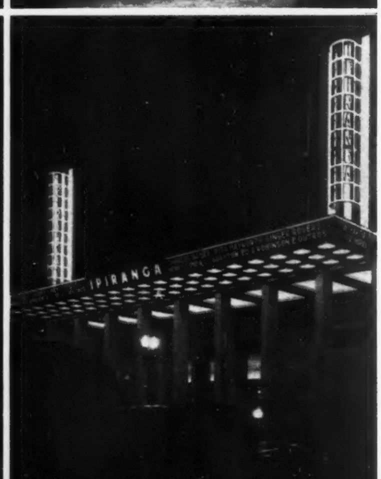
An outstanding example of this method of exterior lighting is provided by the Odeon, Sheffield, where a "Perspex" surface, lit from behind by fluorescent lamps, forms a background for interchangeable red "Perspex" letters hung on horizontal rods. This cinema, which stands at the junction of a number of streets, particularly lends itself to this form of publicity. The sign is, incidentally, equally effective both by day and by night.

**Illuminated name sign at Cinephone, Birmingham (architect, H. Werner Rosenthal, Dipl. Ing., A.R.I.B.A.).**

An alternative arrangement is the deep fascia, and at the Odeon, Reading, 8-in. letters are silhouetted against an illuminated fascia which, being 3 ft. deep, provides plenty of space for the announcement of the current programme.

Floodlighting, either of architectural features of the building or of poster publicity, can at times provide an effective method of achieving large-scale programme advertising at relatively low cost.






## EXTERNAL LIGHTING

**Fig. 1, "Lumenated" ceiling under canopy of Cinephone, Birmingham (architect, H. Werner Rosenthal, Dipl. Ing., A.R.I.B.A.). Fig. 2, Odeon, Worcester (architect, Harry W. Weedon and Partners). Fig. 3, Odeon, Sheffield (architect, Harry Weedon and Partners). Fig. 4, Ipiranga, S. Paulo, Brazil (architect, Rino Levi).**

| 1 | 2 |
|---|---|
| 3 | 4 |

# PART 4: Technical Aspects of Cinema Lighting

**By G. Davidson, M.I.E.E.**

SINCE the architectural effects in the modern cinema depend so much on artificial lighting, it is important to choose carefully the types of light source. Close co-operation between architect and engineer is needed if the architectural effects are to be achieved efficiently. With television as a serious competitor and taxation a great burden, current designs and lighting schemes in the United Kingdom tend to be sober and economical.

The design of the installation must take into account the changes which take place with each performance; the statutory and local authority's regulations or requirements; and the proprietor's policy or procedure in operating the cinema. All the factors involved are not necessarily compatible, but all the technical considerations must be properly co-ordinated in order to produce a harmonious scheme that will satisfactorily fulfil its purpose.

The purposes of the auditorium lighting are to provide pleasing visual effects and a comfortable atmosphere for patrons between programme items, and to give sufficient light to enable patrons to move to or from their seats and, in an emergency, to reach exits in safety. In addition, there must be enough light to enable the cleaners to carry out their work before the cinema is opened to the public. All three purposes require different degrees or qualities of illumination.

### Illumination Levels

The general or decorative lighting is not usually required to provide a high level of illumination; from 0.5 to 1.0 lm/ft$^2$ is common and provides enough light by comparison with the low intensity of the maintained lighting in use while films are being shown. With the exception of foyers, an even distribution of light, though desirable, is not essential. Graduation of the lighting from dark to light areas is an aim in design, and the natural limitations of decorative and other types of lighting fittings used in cinemas may cause a considerable variation of intensity over the area of the auditorium. The maintained lighting may vary between 0.001 and 0.0075 lm/ft$^2$, ignoring reflected light from the screen, the former being the desirable minimum value of safety lighting and the latter a common level for all maintained lighting (management and safety). Cleaners' lighting is usually provided by a suitable number of lamps, either bare and otherwise unused or forming a small part of the general lighting. These lamps often provide almost as high an intensity as the general auditorium lighting, though, with bare lamps, few are needed and the total wattage is low.

The Cinematograph Regulations require the general lighting to have alternative means of control, outside the projection room, which must be effective quickly and independently of the controls in the projection room. This is to enable the general lighting, when out or dimmed, to be switched on rapidly in an emergency. At one time this was done by means of a " black-out " switch at the rear of the auditorium, which was arranged to short circuit the dimmers, but a much simpler means is now sanctioned. The cleaners' lighting is used as emergency lighting and is controlled by switches connected in parallel and situated at the rear of the auditorium, at ground floor and balcony levels. The switches are enclosed so as to be accessible to the staff but not to the public. The auditorium decorative lighting, the lighting in all places in the cinema to which the public are admitted, including passages and stairways, exit signs, and entrances, foyers and other public rooms which are normally provided with special decorative lighting—all this forms part of the general lighting installation.

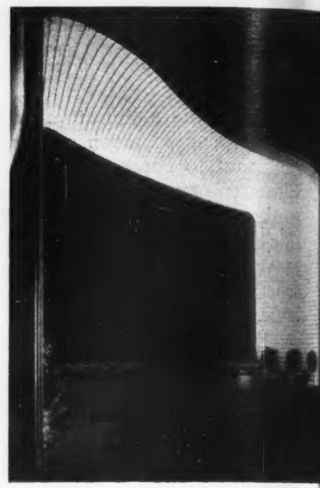
### Economic Considerations

The auditorium general lighting and the curtain lighting are controlled by means of dimmers so that the changes from maintained lighting to general lighting and *vice versa* are gradual and comfortable for visual adaptation. Auditorium colour schemes do not usually contribute to good light utilisation and efficiency since they must not distract attention from the screen during film projection; on the other hand, excessive lamp loading involves high current costs where the tariff includes a charge based on installed loading, because the periods of use are of comparatively short duration and the average unit cost will, therefore, be high.

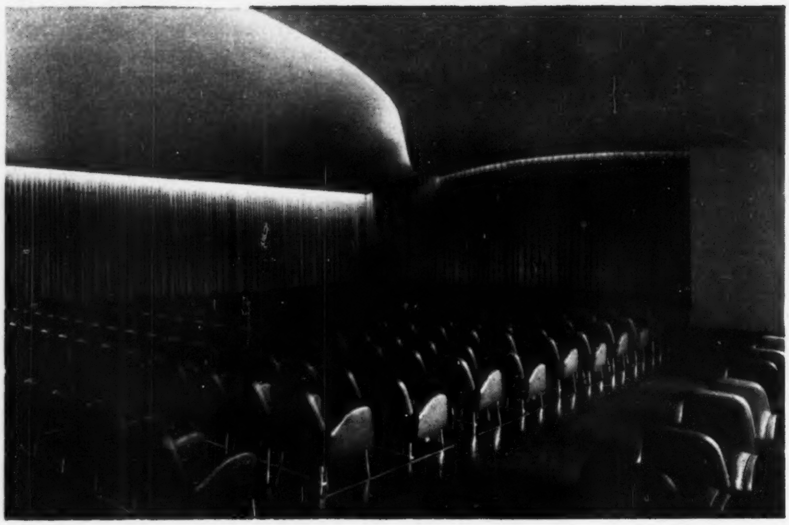
The periods of maximum loading are so short, in fact, that the demand does not generally register on a maximum demand meter. The economics of auditorium lighting are, therefore, of importance at present, when cinema proprietors are finding it difficult to make ends meet and are actually closing a number of cinemas that are not sufficiently economic to maintain. It is conceivable that a cinema load might be designed to take its main supply from storage batteries, which are charged during the night and other " off-peak " hours at a low tariff, to reduce electricity costs and obtain greater license in utilisation, but this would need some study and calculation to show whether it is economical or not.

The simplicity or extravagance of an auditorium lighting scheme, represented by, say, the use of simple direct lighting fittings on the one hand and indirect lighting by

(Continued on page 86)



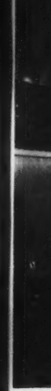
Below, translucent proscenium arch of the GLORIA-PALAST CINEMA, BERLIN, lit by nearly 200 concealed tungsten lamps. Spilt light from this arch illuminates the entire auditorium.



Above, FILMCASINO CINEMA, MUNICH. The auditorium is indirectly lit. The ceiling consists of two overlapping areas, with rows of tungsten lamps concealed in the space between. Drapes along the side walls are lit by lamps concealed above the main ceiling. Below, UNIVERSUM CINEMA, MUNICH. Indirect lighting includes a battery of 200-watt projectors concealed behind the curtain.

# EXAMPLES FROM ABROAD

## Recently Completed Cinemas in Germany



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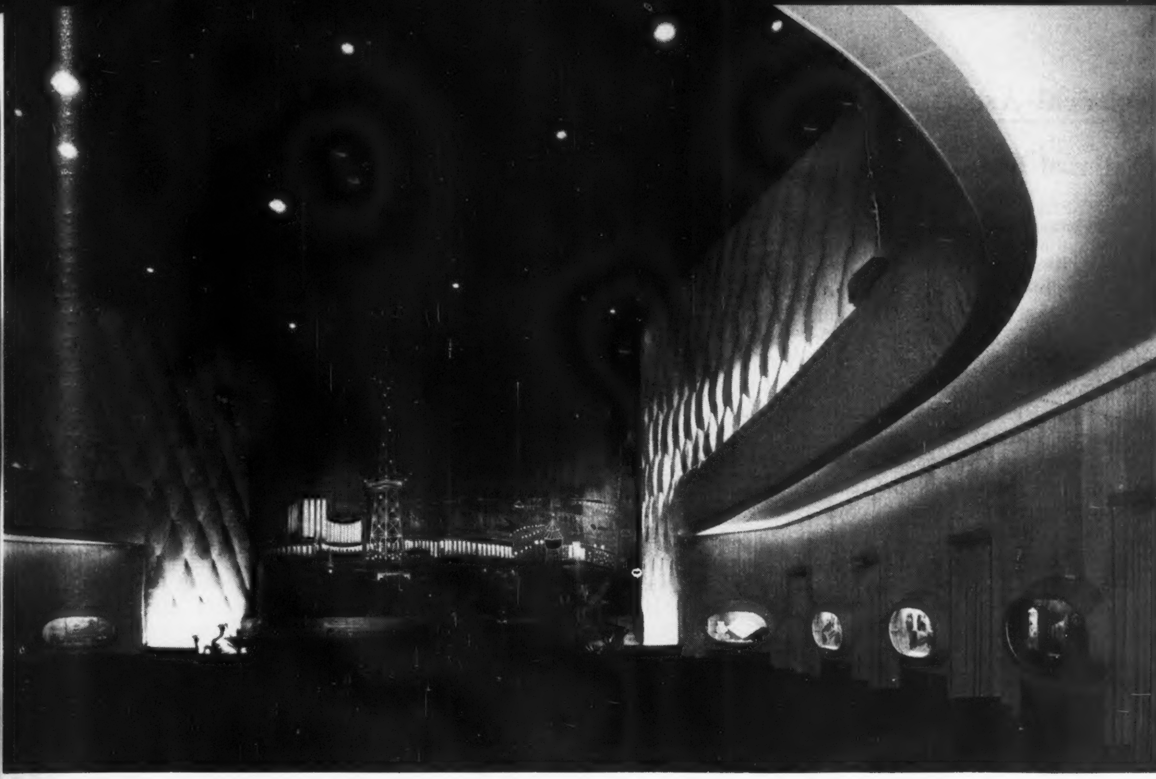
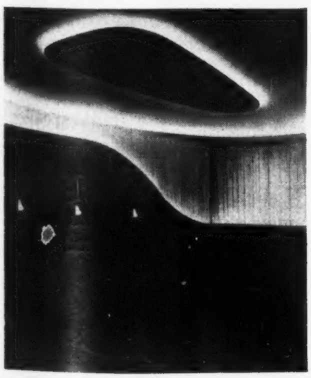
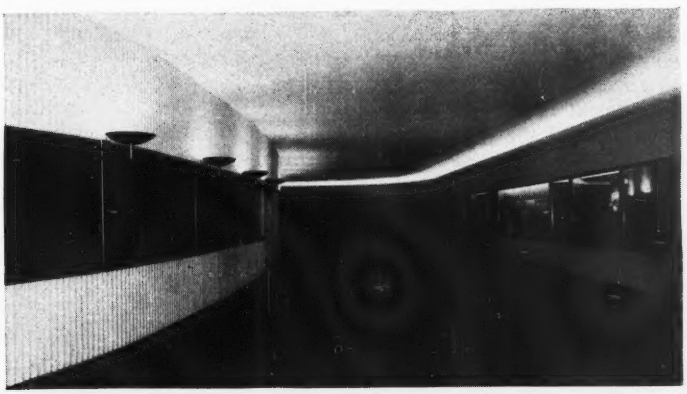


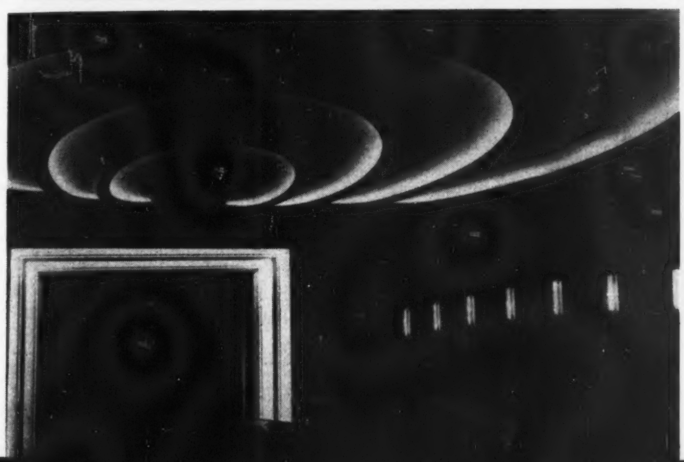
CAPITOL CINEMA, KURFUSTENDAMM, BERLIN. Indirect lighting of auditorium from 150 tungsten lamps concealed in coves in the balcony soffits. Recessed into the "night-sky" ceiling are forty 60-watt downlights. The curtains are lit by two projectors concealed by the walls at the ends of the balconies.



PANORAMA CINEMA, BERLIN. Indirect lighting from tungsten lamps concealed above suspended ceiling feature in centre of auditorium and behind wall lining. Extra light from eight wall brackets each housing two 40-watt tungsten lamps.

Below, foyer and cloakrooms of the CAPITOL CINEMA, DORTMUND. Indirect lighting and showcase lighting by fluorescent lamps. Wall brackets with tungsten lamps give extra light to the ceiling. Bottom, LICHTBURG CINEMA, ESSEN. Ceiling lighting from concealed fluorescent fittings. Lighting of proscenium arch by red, blue, green and white fluorescent lamps.





## Technical Aspects

(Continued from page 83)

concealed lighting equipment on the other, will depend on the locality, class of patron to be served and competition from other cinemas. The efficiency of modern lighting fittings in cinemas is as variable as ever. Designs to satisfy aesthetic taste may be contemporary, possibly with bare lamps or star perforated opaque shades, or period in character. In contrast to the more efficient decorative multi-light pendant, wall bracket fittings and recessed ceiling fittings with direct lighting through louvred bases are frequently used, while the relatively inefficient indirect lighting from cornices and coves continues to be an attraction for lighting and architectural effects.

Recent tests made in some post-war cinemas indicated that the coefficients of utilisation for auditorium lighting were seldom higher than 0.2 with multi-light pendant fittings, and could be as low as 0.02 for indirect wall fittings with GLS lamps and 0.07 for indirect ceiling cove lighting with fluorescent lamps. The same lighting scheme in an interior which is different in shape and colour from another can produce appreciably different results, and it is extremely difficult to forecast the final lighting effects when a cinema is being planned.

### Scheme Efficiency

The costs of the electrical installation as a whole are appreciably affected by the method of lighting adopted in the auditorium. The effect of scheme efficiency on total wattage of lamps and capacity of the distribution system and dimmers is obvious : large numbers of points with narrow light distribution and indirect lighting methods may increase the installation costs by 30 per cent. or more over the costs of a direct lighting scheme with a few efficient multi-light decorative pendants.

Because of the low illumination values required, the short periods of use, and the simplicity and low cost of resistance dimmers, tungsten lamps of low ratings are generally used. Modern high-efficiency sources of light, such as fluorescent lamps, do not find much favour in auditoria except where indirect cove lighting is used without dimming and it is possible to take advantage of the higher light output from these lamps. Dimming equipment for this type of lamp is much more complicated and expensive than equipment for tungsten lamps.

It is possible that, with greater prosperity in the cinema world, more elaborate lighting schemes, with higher intensities and colour changes with discharge lamps, might be more frequently introduced. The curtain lighting is usually provided with colour change and dimmers in each colour circuit, and similar effects are often incorporated in the lighting of the proscenium arch.

The secondary battery for the safety lighting is usually kept in charged condition each day by means of suitable battery-charging equipment supplied with electricity from the public supply mains. If it is a " floating " battery connected to the same source as supplies the general lighting, it must be capable of carrying the safety lighting load in the cinema for a period of at least three hours. Otherwise, it must be capable of supplying the safety lighting during the whole time the public is on the premises. The wiring for the safety lighting must be kept entirely separate from other wiring and separate conduits must, therefore, be used for it.

Controls for lighting in a cinema must not be accessible to the public. The general lighting of the auditorium, curtains, etc., is always controlled from the projection room, adjacent to which the dimmers are situated. All other control switches for other parts of the cinema to which the public have access are usually grouped in a switchroom reserved for the purpose, but general lighting control switches must not be located in a rewinding room. The safety lighting controls are often located in a further separate room, situated close to the battery room and charging equipment.

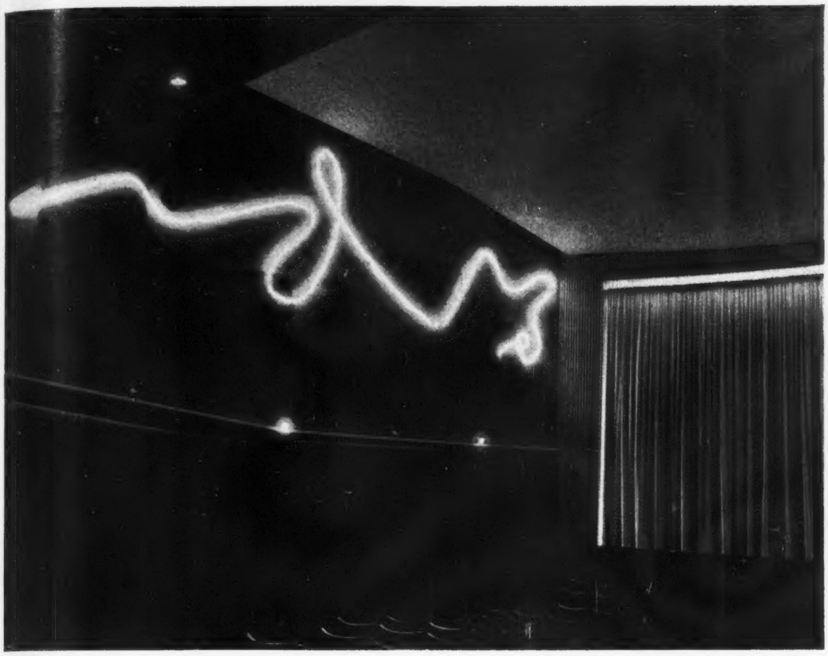
### Distribution System

Electricity distribution to the various sections of cinema lighting is usually divided to suit the location of each section and its control switches. The neon signs form a separate section, as regulations require them to be switched off by firemen outside the building in the event of fire. There must be, therefore, a " fireman's switch " on the external wall, usually on the street frontage and fixed in a conspicuous position not more than 9 ft. from the ground. The auditorium decorative lighting forms a separate section, controlled from the projection room, while both primary and secondary maintained lighting in the auditorium, the " front of house," the exterior and the " rear of house " (or stage end) all have their own separate distribution sections. There are generally further separate sections for essential lighting in private and staff rooms and for the projection room suite.

To-day, cinemas in large towns and cities do not usually provide for theatrical stage entertainment and, except for decorative curtain lighting, stage lighting equipment is not normally provided. However, where stage presentations are envisaged, floodlighting, spotlighting, footlight and batten equipment, and colour-changing controls may be necessary. Spotlights or floodlights operated from (and often located in) the projection room are often provided to give suitable lighting when the stage is used for announcements or during meetings. Where full stage lighting is required, a stage switchboard for its control is usually fixed on a raised platform over the wings on the actors' left. This switchboard incorporates dimmers so that numerous graduations and colour effects can be obtained.

### Dimmers

Resistance dimmers for the control of auditorium and stage lighting are bulky and are usually accommodated in a room adjoining the projection room (though they must not be installed in a rewinding room), with the operating handles projecting through the wall so that they can be operated from the projection room. Three handles are used to control the three colours of each section of the decorative lighting to be dimmed and their skilful use enables a wide variety of colour effects to be obtained. In some cinemas the dimmers are motor-driven and have remote controls.

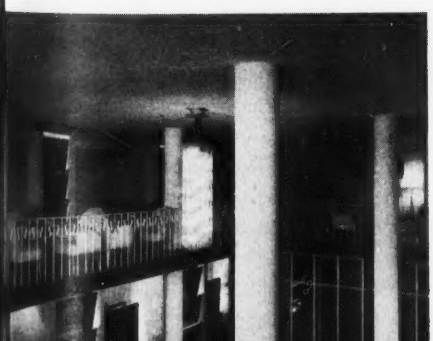


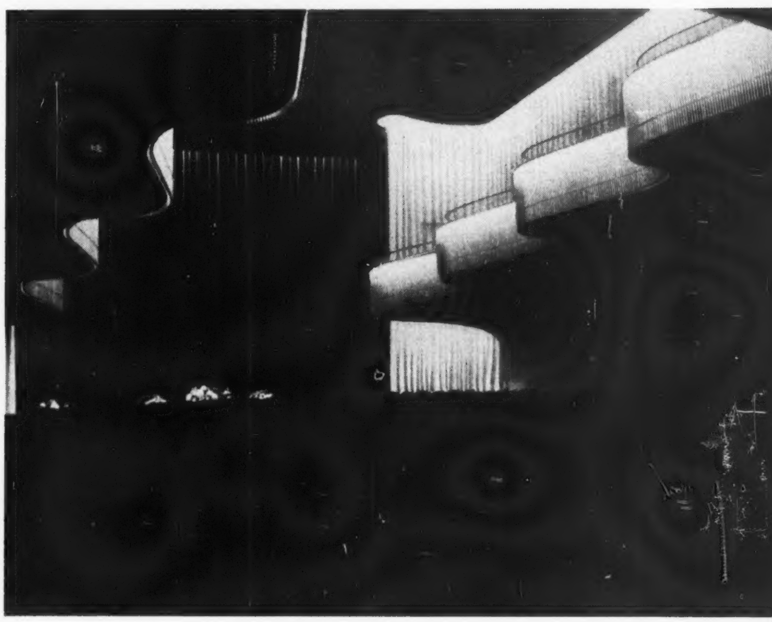
**FILMCASINO, ESSEN.** Cold-cathode "murals" along the side walls provide most of the general lighting of the auditorium. Extra light comes from spotlights fixed to the edges of the side aisle soffits. The rear of the stalls is lit by downlights recessed into the balcony soffit.

## EXAMPLES FROM ABROAD

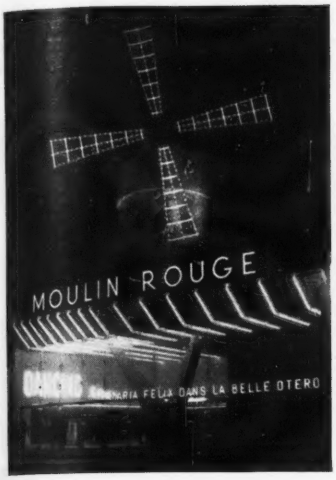
# Cinemas in Germany (continued)

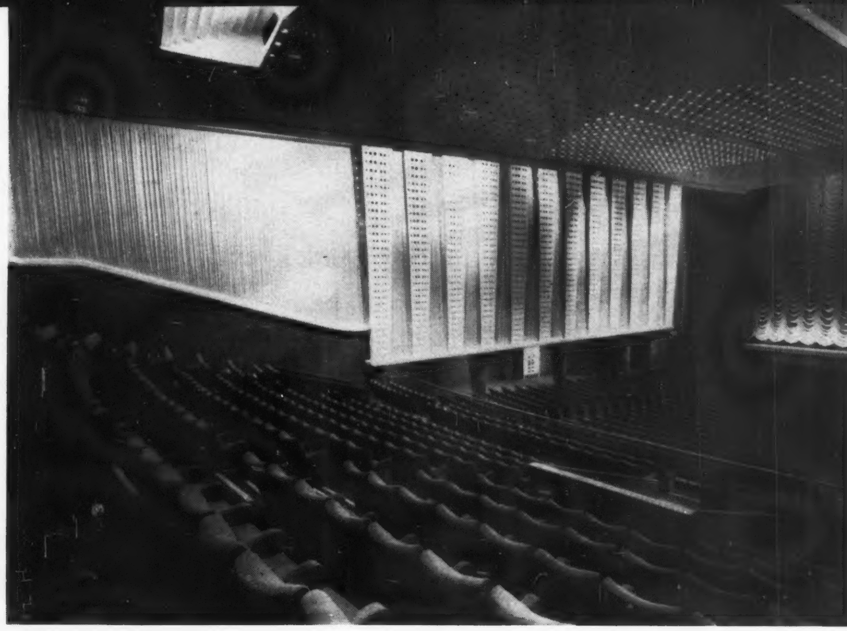
Below, foyer of **FILMCASINO, MUNICH,** seen from the gallery. It is lit by a chandelier of glass tubes. Additional light comes from fluorescent lamps concealed by diagonally sloping panels of black plastic. The auditorium of this cinema is illustrated on page 84.





Above, **ALHAMBRA CINEMA, MANNHEIM.** The side walls of the auditorium, which are fabric hung, are lit from above by rows of tungsten lamps in mirror reflectors recessed into the ceiling. The balcony front is lit by a continuous line of cold-cathode tubing concealed by the coping (see photograph on page 72). Architect, Paul Bode. Photograph by Artur Pfau.



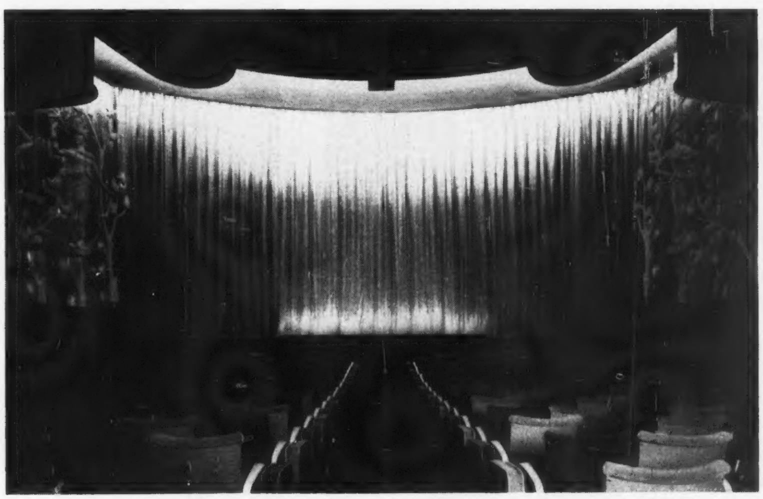



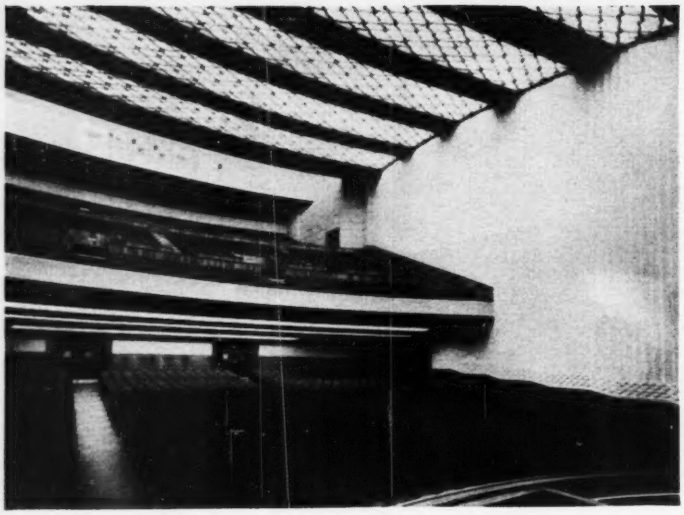
**THE MOULIN ROUGE, PARIS, designed by G. Peynet, seats an audience of 1,600. The auditorium is lit indirectly by 16 batteries of projectors mounted above the suspended ceiling, and directed towards the side and rear walls and the curtains. Each battery comprises four projectors—one red, one blue, one green and one yellow, and an apparatus called a "chrome-selector" adjusts automatically the strength of each according to the colour selected by the projectionist. In the soffits of the galleries which flank the auditorium are indirectly lighted domes, while perforations in the suspended ceiling allow a component of direct light from the projectors above.**

# EXAMPLES FROM ABROAD

## Two recently completed French cinemas

**CINEMA LE MARIVAUX, PARIS, designed by M. Gridaine. The auditorium is lit mainly by reflected light from the projectors which are directed on to the curtains and pelmet. A number of lamps are concealed behind the sculptured panels which flank the stage.**

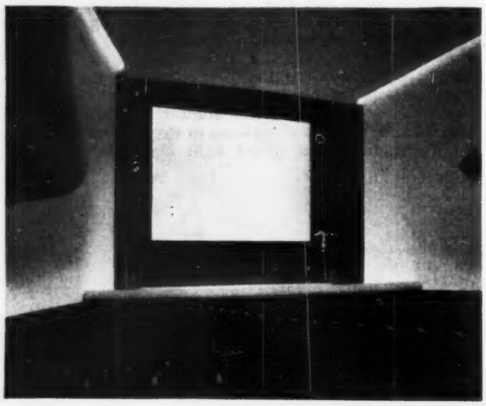




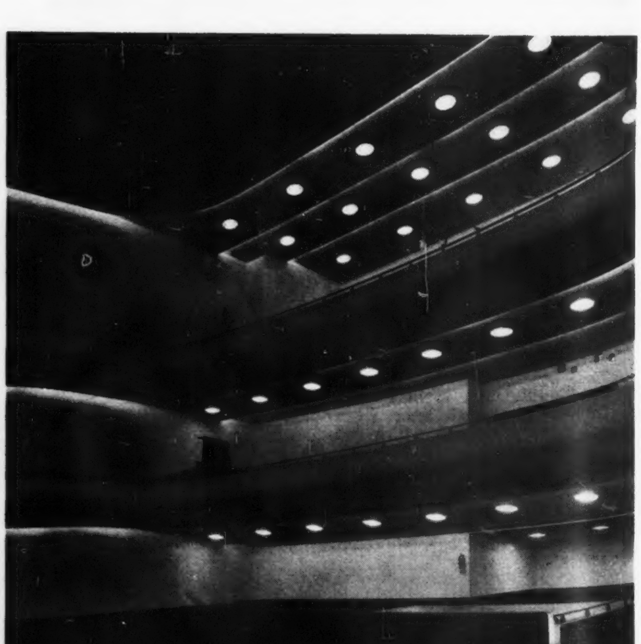
**S. JORGE CINEMA, LISBON, designed by Fernando Silva. The auditorium is lit by a luminous ceiling divided into bands the full width of the auditorium and covered by decorative laylights. The rear of the balcony is lit by downlights recessed into the soffit of the projection room. The foyer (below) is lit indirectly by lamps concealed in the partially coffered ceiling.**

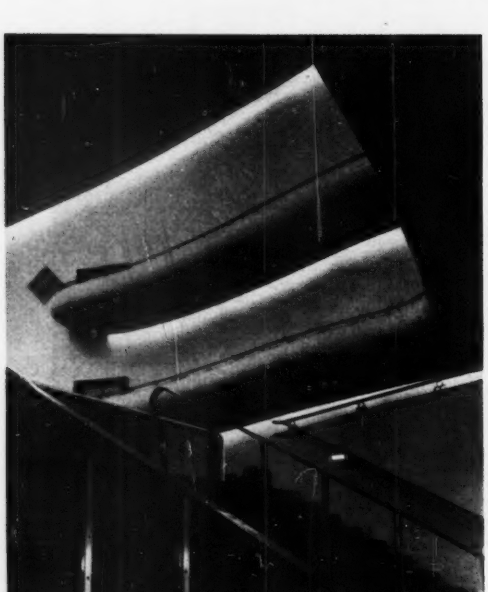
# EXAMPLES FROM ABROAD

## Cinemas in Portugal and Brazil



**THE IPARANGA CINEMA, S. PAULO, designed by Rino Levi. Left, the auditorium looking towards the screen; below, the auditorium looking towards the rear; below left, the staircase leading from the entrance foyer to the stalls. The auditorium lighting is a combination of indirect lighting from lamps concealed around the edges of the false ceiling and the balconies, and downlights recessed into the balcony soffits and into the tiered ceiling over the top balcony. A photograph of the exterior of this cinema is reproduced on page 82.**





# HOME LIGHTING

## PART 2 - - - THE LIVING-ROOM

**An investigation in six parts by Derek Phillips, M.Arch. (M.I.T.), M.C.D., B.Arch. (L'pool), A.R.I.B.A.*, into the relationship between architecture and lighting in the modern home.**

**THIS article, the second in the series, deals with the drawing-room and the combined drawing-room/dining-room. This area, the most used area in the home, must provide an environment suitable for complete relaxation, for carrying out difficult visual tasks and for many activities between these two extremes. The subject can be divided conveniently into two parts—general and local lighting—and this article deals only with the former. Local lighting for the living area will be dealt with in the next article of the series.**

### THE PROBLEM

Traditionally, lighting fittings for the living area have been chosen as "furnishings" more for their ability to fit into schemes of decoration than for their lighting properties. It is right, of course, that the fittings should be in keeping with other elements of the decorative scheme, but this is only part of the problem. Without proper light a house can be a highly dangerous place in which few activities can be carried out either safely or accurately.

The illumination levels recommended for living areas vary from 20 $lm/ft^2$ to as little as 1 or 2 $lm/ft^2$. Needs for various purposes are given in the table below :—

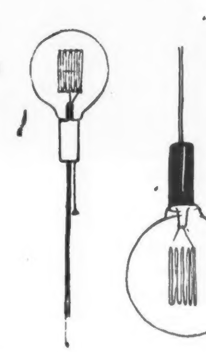
| | $lm/ft^2$ |
|---|---|
| Sewing | 20 |
| Homework and sustained reading | 15 |
| Casual reading and games | 7 |
| Dining | 7 |
| Normal movement | 3 |
| Conversation, relaxation | 1-2 |

In the United States the figure of 20 $lm/ft^2$ is already being exceeded, and it is probably only a matter of time before higher levels will be recommended here. It is not sufficient to provide only for the maximum intensity at all times as this would be as monotonous as it would be wasteful; it is essential also, now that people no longer arrange their furniture in permanent positions, to provide the means whereby the illumination level can be varied at will in different parts of the room. We should provide, too, for effects of light and shade, without which the room appears dull, and for the comfortable viewing of television.

In the past general, or background, lighting has been provided by three methods—by a pendant fitting suspended from a focal point in the room, giving indirect or semi-indirect light; by wall brackets creating patterns of light related to the decorative scheme; and by "spilt light" from local light sources—standard and table lamps.

When these methods are used in the contemporary house, with its simple wall and ceiling surfaces and its low ceiling, the effect is often disastrous and generally mundane. If a central fitting is used it is either fixed to the ceiling or suspended too close to it, so that it cannot give adequate light either upwards or downwards. Wall brackets, on the other hand, in the absence of the decorative panel "setting" of the eighteenth- and nineteenth-century interior, produce pools of light totally unrelated to the architectural composition.

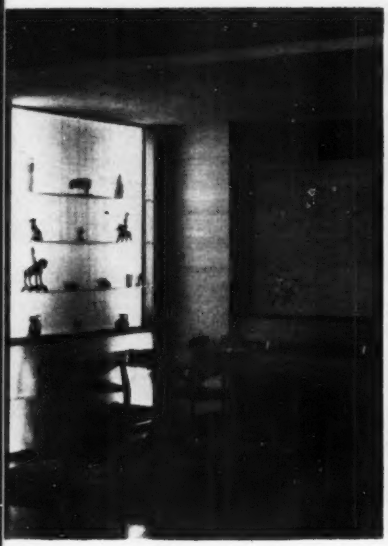
**Fig. 1, Scandinavian low-wattage decorative lamps.**



The question of general lighting received considerable attention in the research work of the Building Research Station Lighting Group, the results of which were published in 1944. The recommendations of the group were included in the BSS Code of Practice CP324.101.1948.

* Consultant architect to the A.E.I. Lamp and Lighting Co., Ltd.

**Fig. 2, house at Sheen, designed by Leslie Gooday and Wycliffe Noble, A./A.R.I.B.A. A difference in level between the dining area and the sitting area has provided an opportunity for built-in lighting for the latter.**



**Extreme left, Fig. 5, flat at Battersea, designed by J. Groag, for Mr. Alan Best, showing the use of fluorescent lighting for the wall of a dining area. The background light it provides needs supplementing by tungsten lamps or candles. Left, Fig. 6, sitting area of same flat, emphasized by raised ceiling lit by concealed cold cathode lighting around the edge.**

This, however, went no further than to recommend, first, a fixed fitting on the ceiling, either placed centrally or related to the most important area of the room in such a way as to give at least 3 lm/ft$^2$ over half the area of the room; second, the provision of three other plug points (exclusive of heating points); and, third, a permissible degree of glare.*

These suggestions recognise the need for good general lighting and the

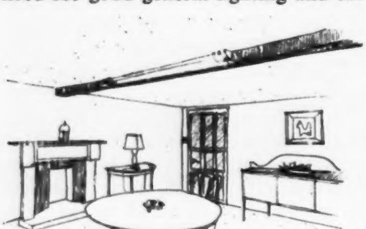


**Fig. 3, early use of fluorescent lighting in the home. The illustration is drawn from an actual example !**

importance of flexibility, and they have been widely accepted by those responsible for local authority housing. But they should be considered by architects and lighting engineers not as a standard to be achieved but as a point of departure.

**THE NEW APPROACH**

It is clearly not possible to give a set of hard and fast rules for any aspect of home lighting, for houses differ in so many ways, as does individual taste. There are some people who, whatever is said about comfort, glare, brightness and contrast, will choose to light their living room by a 3-ft.-dia. sphere suspended to near floor level, while unusual new lighting equipment, such as the Scandinavian low-voltage decorative filament lamp (Fig. 1), will always have its devotees.

The problem of providing 3 lm/ft$^2$ over half the area of the room is not difficult, but it must be provided in a way related to comfort and the architectural unity of the room. For general lighting there is much to be said for the use of the fluorescent source. The shape of the lamp makes it easy to conceal and suitable for lighting the entire extent of wall surfaces, while its low current consumption allows it to be left in use for the whole of the evening, providing constant safety and an immediate welcome whenever a room is entered. There are now fluorescent lamps of excellent colour characteristic, such as the "de luxe warm white," which gives colour rendering similar to tungsten.

Due to the initial difficulties with fluorescent lamps, there is still considerable prejudice against their use in the home, which has not been lessened by such installations as that shown in Fig. 3—a sketch of an actual scheme carried out during the early days of fluorescent lighting. One of the first ways in which fluorescent lighting was used in commercial buildings was for the indirect lighting of ceilings from rows of lamps placed behind a cornice. Where this method has been applied to the home, successful effects have often been achieved and the method can be used where differences in ceiling level occur (Fig. 4).

General lighting can be provided by lighting only the walls, leaving the ceiling in comparative darkness. This

**Fig. 4, lighting trough between sitting area and dining area. It lights the ceiling and provides "functional" lighting at a change in floor level. House at Thurlaston. Pat Hossack, A.R.I.B.A.**

method is particularly suitable for reconstruction schemes, where one wishes to modify the apparent proportions of a room by painting the ceiling a dark colour. A simple way to flood a wall with light is to stop the ceiling short of the wall and conceal fluorescent lamps in the recess thus formed. (The new reflector fluorescent lamp is particularly suitable for this purpose.) Fig. 7 shows how this can be done with normal timber floor construction.

Where part of the living space, such as the dining area or a sitting area, needs emphasizing, the ceiling level may be raised or lowered and special lighting treatment applied to the raised or lowered portion. If the ceiling is dropped, fluorescent lamps can be fixed above it (round the edges) to shine on the remainder of the ceiling, thus emphasizing the lowered portion by contrast. If the ceiling is raised, it can be lit by "beams of light"—fluorescent batten fittings shining upwards. As a third alternative, a suspended luminous ceiling can be formed, with fluorescent lamps placed above a simple laylight, the structure of which

* This recommendation reads: "Brightness when measured over any reasonable area at an angle of view between the horizontal and 60 deg. from the downward vertical, should not exceed 10 cd/in$^2$.

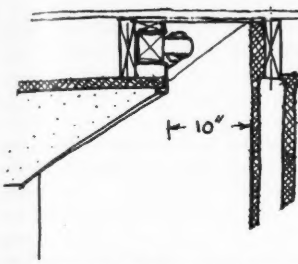



**Fig. 7, the use of fluorescent lamps to flood a wall with light—with traditional floor construction.**

can play an important part in the decorative scheme (Fig. 8).

It is not advisable, however, to have a luminous ceiling over the entire living space, unless sections of it can be switched on and off independently, according to which part of the room is in use. A design of this latter type, being flexible in character, could, in conjunction with suitable local lighting, provide an efficient and interesting lighting scheme.

Emphasis of part of the room by other means—e.g., by a change in flooring material—can also be accompanied by special lighting in sympathy with the architectural treatment. For instance, a partition dividing a sitting area from a dining area can be made into a "wall of light," using a large area source to give a flood of light on one side (Fig. 5). By using fluorescent lamps behind suitable plastic sheeting, this effect can, nowadays, be achieved quite economically.

Variety in the scheme can be achieved by several means: in addition to simply varying the intensity of light or its distribution, extra light from tungsten lamps can be used to cast interesting shadows, while equipment for changing the colour of the light, though expensive, can make possible variations to suit the season of the year or the mood of the occupant.

Another approach to general lighting for the living-room is to use lighting fittings at a low level—e.g., light from behind low bookcases or from trays holding indoor plants can be made to illuminate a wall or ceiling surface. Fluorescent lamps are suitable for this purpose, though tungsten lamps can be used, too. In fact, an inexpensive way of lighting a ceiling is by directing on to it light from appropriately designed wall fittings or standard lamps. With all these methods, however, it is important to ensure that the light sources are screened to prevent glare.

Special lighting should be provided to show to the best advantage such features as bay windows, "wall-to-floor" curtains, paintings, or collections of glass or pottery (Figs. 5 and 6).

Finally, in houses with large areas of plate glass through which there are pleasant views, the occupants may often like to leave the curtains undrawn on summer evenings; to allow for this, the lighting should be such as to prevent views through the windows after dark from being marred by unpleasant reflections.

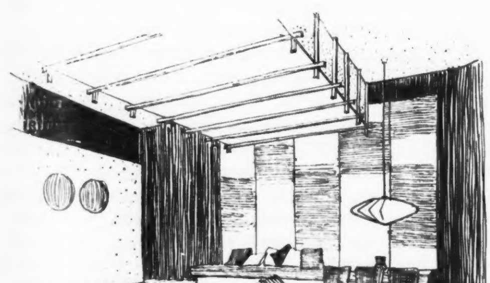
## COMMENT

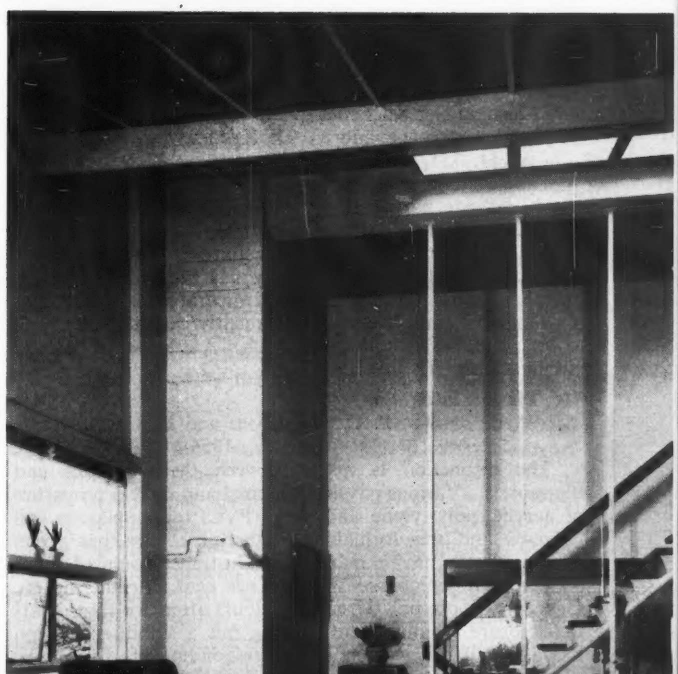
### By an architect

I like Mr. Phillips's examples of modern domestic lighting and did not know of such good ones here. I question one general point—the use of a lowered area of ceiling with lighted surround. A dark patch with high brightness around it is something I always find uncomfortable.

### By a lighting engineer

A demand by owner-occupiers for imaginative home lighting schemes of the kind suggested by Mr. Phillips will give lighting engineers wider scope for the exercise of skill and the satisfaction of creating more varied luminous environments in homes.





**Above, Fig. 8, laylight suspended over special area, its structure contributing towards the decorative scheme. Right, Fig. 9, house at High Beach, designed by John Barton, A.R.I.B.A. General lighting is from a special recessed unit, which also gives light to the staircase area, where it is supplemented by spotlights fixed to the ceiling.**

# Lighting Abstracts

## OPTICS AND PHOTOMETRY

**407. The evaluation of discomfort glare.** 612.843.367

G. A. FRY, *Illum. Engng.*, **51,** 722-728 (*Nov.*, 1956).

Numerical assessments of discomfort glare obtained by Harrison and Meaker's glare rating method, Luckiesh and Guth's BCD index and Meaker and Oetting's visual comfort index are related to one another as also are Luckiesh and Guth's position index and Harrison and Meaker's location coefficient. Harrison and Meaker's method for assessing the discomfort from a number of glare sources viewed together is compared with the method proposed by Logan and Lange. Guth's additivity equation is examined and is shown to be inapplicable to a single uniform source divided into a number of smaller areas. P. P.

## LAMPS AND FITTINGS

621.327.43

**408. Measuring electrical output of rapid start ballasts by a light output method.**

R. D. BRADLEY and M. M. BUZAN, *Illum. Engng.*, **51,** 743-744 (*Nov.*, 1956).

The superimposition of cathode heater wattage on arc wattage in a rapid-start (transformer) fluorescent lamp circuit makes it impracticable to measure ballast output watts in such a circuit with normal laboratory test gear. Selected lamps were therefore calibrated for light output against wattage input, using standard reactors, and these lamps were then operated in conjunction with the rapid-start ballast under test. The light output from the lamp under these conditions was measured and the corresponding ballast output wattage derived from the calibration. P. P.

621.327.43

**409. Flashing characteristics of fluorescent lamps.**

J. H. CAMPBELL and D. D. KERSHAW, *Illum. Engng.*, **51,** 755-760 (*Nov.*, 1956).

The development of fluorescent lamp dimming circuits in which cathode emission is continuously maintained at an optimum level has provided the basis for practical fluorescent lamp flashing circuits. Rapid (transformer) start circuits are used for this purpose and a study has been made of their operating characteristics. Cathode temperature is a determining factor of lamp life and consequently cathode volts need to be maintained within close limits. A number of flashing circuits are briefly described. P. P.

**410. Plastics in lighting.** 535.8

W. E. BROWN, P. C. WOODLAND and R. J. LEE, *Illum. Engng.*, **51,** 731-742 (*Nov.*, 1956).

The distinction is made between thermoplastics and thermosets. Various physical, thermal and optical properties of acrylic, polystyrene and vinyl (PVC) thermoplastics and polyester and urea formaldehyde thermosets are then given. Thermoplastics have a maximum light transmission of about 90 per cent. compared with 65 per cent. for thermosets. General purpose polystyrene discolours after two-three years of exposure to fluorescent lighting but a stabilised version has a life of five years. The corresponding life for acrylic plastics is ten years. Colour standardisation, hiding power, ultraviolet light stability, static dust collection and fire hazards are other aspects dealt with. P. P.

**411. New developments in short arc lamps.** 621.325

T. C. RETZER and G. W. GERUNG, *Illum. Engng.*, **51,** 745-752 (*Nov.*, 1956).

Constructional details and operating characteristics are given for five types of mercury and mercury-xenon short arc lamps. Operation on A.C., rather than on D.C. as in this country, necessitates more complex electrodes. The warm-up period is shortened by the adddition of xenon and shortened still further by platinizing one side of the lamp bulb. The lamps have advantages in searchlights operated by remote control over extended periods. Applications at La Guardia Airport and on the Empire State Building are referred to. P. P.

**412. Flashing applications of fluorescent lamps.** 621.327.43

R. W. BUNNER and R. T. DORSEY, *Illum. Engng.*, **51,** 761-767 (*Nov.*, 1956).

Techniques for using fluorescent lamps for advertising in flashing circuits are described in terms of flashing sequences, colour changes and complementary colour and fade-out effects. Spectral distribution curves for ten standard types of American fluorescent lamp are given for this purpose. Two circuits for operating flashing fluorescent lamps are described and the design requirements for the ballasts are also referred to. P. P.

621.327.4

**413. Water-cooled xenon lamp for testing fastness to light.**

H. ILZHOFER, *Lichttechnik*, **8,** 529-533 (*Dec.*, 1956). *In German.*

The spectral distribution of the 6-kw. water-cooled xenon lamp (XBF 6000) in a jacket of special glass with high transmission in the u.v. is closely similar to that of total daylight, i.e., sunlight and skylight together, over the range 300 to 600 $\mu$. The distribution over the longer-wave range to 800 $\mu$ can be made quite similar by using 2 mm. of Schott filter KG 1. With this lamp it is possible to accelerate fading tests on coloured specimens because illuminations of up to 50,000 lm/ft$^2$ can be obtained. The author describes apparatus in which 18 specimens can be exposed simultaneously to 20,000 lm/ft$^2$. The results agree well with those obtained by exposure to natural daylight. The life of the lamp is, on the average, 600 hours. J. W. T. W.

621.327.43

**414. Interior lighting with high output fluorescent lamps.**

W. H. JOHNSON, *Illum. Engng.*, **51,** 803-809 (*Dec.*, 1956).

The operating characteristics of the new American 8-ft. (100-watt) "rapid start" fluorescent lamp have been compared with those of the older 8-ft. (74 watt) "slimline" lamp, and with other lamps, in industrial and commercial lighting installations using adaptations of existing luminaires. For industrial lighting the new lamp has advantages over all other lamps except the fluorescent-mercury lamp used in a narrow-distribution luminaire. For commercial lighting the comparison was not so favourable, existing commercial luminaires providing insufficient ventilation to dissipate the extra heat from the rapid start lamp and thus keep it at an optimum operating temperature. P. P.

621.327.43

**415. Fluorescent lamp performance as affected by impurity gases.**

R. W. MOONEY and W. C. GUNGLE, *Illum. Engng.*, **51,** 793-798 (*Dec.*, 1956).

The effect of impurity gases on the starting characteristics and lumen maintenance of fluorescent lamps has been studied by artificially introducing various concentrations of gaseous impurities into the filling gas. Except with

oxygen, all the impurities produce hard starting and in some cases considerable discoloration. Lumen maintenance is relatively unaffected by oxygen and gaseous oxides but is improved by small concentrations of nitrogen. Water vapour, hydrogen and gaseous hydrocarbons adversely affect lumen maintenance, the extent being directly proportional to the concentration of active hydrogen atoms available. The Butler-Lowry equation giving the decay in lumen efficiency with burning time was shown to agree with the laboratory measurements. P. P.

621.326

**416. Characteristics and applications of axial filament lamps.**

C. W. PEARSON, E. A. LINDSAY and R. T. DORSEY, *Illum. Engng.*, **51**, 782-789 (*Dec.*, 1956).

500-, 750- and 1,000-watt lamps have been developed in which 15 per cent. increases in initial light output and lumen maintenance have been achieved by mounting the coiled-coil tungsten filament along the bulb axis. The improvements result from reduction in the cooling effect of the filling gas, the higher filament operating temperature and the reduced amount of light directed towards the lamp base. A more localised blackening pattern also facilitates lumen maintenance. Photometric comparisons are made between the present lamps and lamps of more conventional filament construction when used in numerous types of reflector. P. P.

## LIGHTING

628.971

**417. Some factors that influence the design of daytime effective exposed lamp signs.**

A. L. HART, *Illum. Engng.*, **51**, 677-682 (*Oct.*, 1956).

When letters are formed from rows of light sources, as in an advertising sign, then their legibility is determined by the apparent size of the spot of light formed by each source in relation to the spacing between individual sources. For night-time viewing conditions, Atherton developed a formula giving minimum letter height for legibility, taking into account spot size and viewing distance. This has now been supplemented by data obtained from a study of the day-time legibility of a test sign in which reflector spotlights were used. A table summarises the change in appearance of the test letter with time of day, sky luminance and horizontal and vertical outdoor illuminations. P. P.

**418. Lighting requirements for older workers.** 612.843.6

S. K. GUTH, A. A. EASTMAN and J. F. MCNELIS, *Illum. Engng.*, **51**, 656-660 (*Oct.*, 1956).

A group of 100 observers, ranging in age from 17 to 65 years, used the Luckiesh-Moss Visibility Meter to determine the visibility levels of selected printed words at illumination levels ranging from 10 to 100 lm/ft$^2$. It was found that up to the age of about 45 or 50 the visibility achieved with a particular illumination level decreased only gradually (or the illuminaton necessary to produce a particular visibility level increased only gradually). Beyond this age though the variation with age was more pronounced. For example, a visibility level which required an illumination of 30 lm/ft$^2$ in the youngest age group (17-20 years) required a further 5 lm/ft$^2$ in the age group 41-50 years, but a further 25 lm/ft$^2$ in the oldest age group (61-65 years). P. P.

**419. Lighting of the Jenner Tunnels at le Havre.** 628.971

*Revue Generale de l'Electricite*, **65**, 569-570 (*Oct.*, 1956). *In French.*

Gives details of the vehicular tunnels at le Havre and of their lighting, including the various lighting levels in the entrance and exit zones for night, overcast daylight and sun-light; lighting equipment; precautions taken against damp and low temperatures and distribution and emergency lighting services. J. M. W.

628.971

**420. Calculation of seeing distance given the light distribution from a motor-car headlight.**

J. B. DE BOER and W. MORASZ, *Lichttechnik*, **8**, 433-437 (*Oct.*, 1956). *In German.*

Several attempts have been made to calculate seeing distances for objects ahead of a driver, when glared by the headlights of an approaching car. This car is assumed to have headlights giving the same light intensity distribution as those of the driver's car and the glare is assumed proportional to $E/\theta^2$ where E is the illumination produced at the driver's eye by the oncoming headlights and $\theta$ is the angular separation of the nearest headlight and the object viewed. [See, e.g., Abstract No. 167 (July, 1955).] The authors of the present paper find that this assumption is not justified and they have investigated experimentally the relations between the various quantities involved, viz., luminous intensity of the driver's headlights in the direction of the object, luminous intensity of the glaring headlights in the direction of the observer's eye, position of the glaring headlights relative to the object, distance of the object from the driver when it first becomes detectable (the seeing distance). The results are tabulated for a range of typical values and for the condition that the glaring headlights are stationary. J. W. T. W.

**421. Glare in street lighting.** 628.971.6

A. PAHL and R. CHODURA, *Lichttechnik*, **8**, 480-486 (*Nov.*, 1956). *In German.*

The authors give a long and detailed review of the principal work so far carried out on disability glare and on discomfort glare, which they refer to as physiological glare and psychological glare respectively. On the basis of this work they give algebraic expressions by which these two forms of glare can be assessed numerically for a street lighting installation of known characteristics. They point out that in such an installation the relative contributions of the different lamps are not the same for the two kinds of glare; the fraction of the total effect contributed by the nearest lamp, for instance, is greater for discomfort than for disability glare. Two installations, with lanterns giving different light distributions, are compared by means of the formulae developed by the authors. J. W. T. W.

628.946

**422. Obstruction lights and danger signals on the Stuttgart television tower.**

H. E. SCHREIER, *Lichttechnik*, **8**, 477-479 (*Nov.*, 1956). *In German.*

The top of this tower is 1,000 feet above the level of the airfield at Stuttgart-Echterdingen and its position has therefore to be made clearly visible to a pilot, not only at night but also during the day when the visibility is at the lowest value considered practicable for flying. Red obstruction lights are mounted at different heights above the base, but at the top there is a system of three high intensity beacons each giving two narrow beams with a maximum intensity of 40 million cd. In each beacon a pair of fresnel lenses rotates four times per minute about a 2-kw. high-pressure xenon lamp giving 70,000 lm. The resulting flashing frequency is such as to avoid any possible confusion with the airport light. J. W. T. W.

# I.E.S. ACTIVITIES

### Birmingham Centre

The biennial display of new lighting fittings was held at the Technical College, Suffolk Street, Birmingham, on January 1, when a considerable number of members and guests were present. Mr. Heydon, chairman of the Centre, referred to the usefulness of such a display inasmuch as users in particular were able to examine new products and have their queries answered, something one could not do with a catalogue.

Each of the manufacturers showing new equipment was permitted to display up to four fittings and was allowed four minutes in which to describe their main features. The types of fittings shown fell roughly into four groups, street lighting fittings with emphasis on post top lanterns; completely dust-proof industrial fittings for tungsten and mercury lamps; fittings for both tungsten and fluorescent lamps with special facilities for speedy dismantling for maintenance and cleaning; contemporary domestic fittings (one manufacturer showed a new range of fluorescent fittings specially designed for the domestic market).

The discussion which followed was opened by Mr. Partridge. A number of people put questions to the manufacturers concerned and/or gave opinions on the trends in design as shown in the display. The display was then thrown open to all for a general examination and the members and guests present were permitted to visit each and every stand to see the various products and obtain from the manufacturers information as required.

At the Sessional Meeting of the Birmingham Centre on January 25 Mr. Gura, of Oscar Faber and Partners, presented a paper entitled "The Lighting and Electrical Installation at Leeds Central College." The paper was concerned mainly with the contracting side of the business, making only passing reference to lighting. Mr. Gura's task was not an easy one under the circumstances, but he certainly held everybody's close attention. The discussion was opened by Mr. Yeates, and the proposal of thanks was given and supported by David Lewin and R. Hazlehurst.

### Leicester Centre

The January meeting of the Leicester Centre, held on January 28, took the form of a Brains Trust.

Mr. D. H. Parry, Manager of the Leicester Sub-Area of the East Midland Electricity Board, was the Question Master, and the panel of experts included Mr. Wallace of the Electricity Board, Nottingham; Mr. A. E. Bird, of the A.E.I. Lamp & Lighting Co. Ltd., Leicester; Mr. I. Ball, A.R.I.B.A.; Mr. L. A. B. Lowe, Contracts Director of the Electrical Equipment Co. (Leicester) Ltd.

A considerable number of questions were submitted to the panel, and they covered a variety of subjects including electric lighting in the home and industry building design and construction, neon lighting and architecture, generation and electricity supply and tariffs, and lamp manufacture and technique.

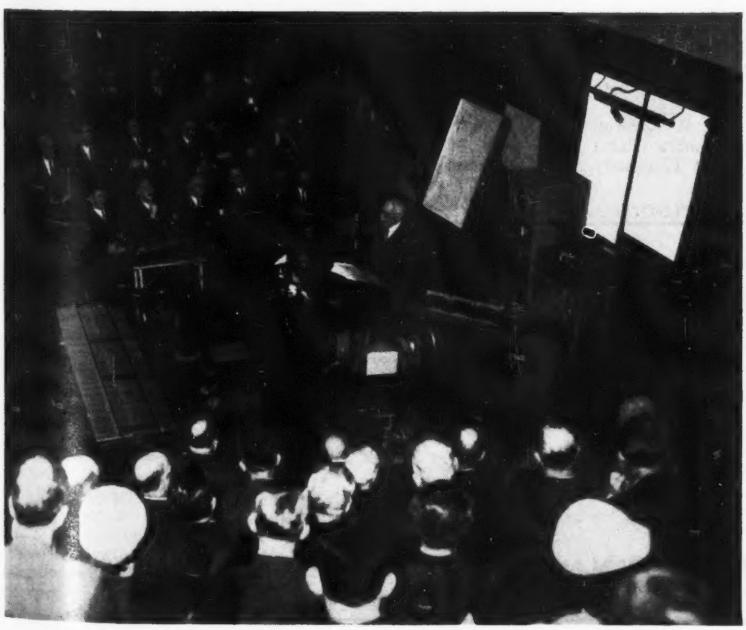
The meeting was a most successful one, and the members of the panel were congratulated on the competent way in which they dealt with the questions.

### Liverpool Centre

At a meeting held on January 15, Mr. C. C. Smith, a past chairman of the Centre, presented a paper entitled "A Review of Street Lighting in Great Britain," a paper he had previously given in 1956 at the A.P.L.E. Conference in Blackpool.

The history of street lighting was traced from the fourth century A.D. when in Antioch a form of street lighting was known. The first known lighting in this country was in 1415, when the Mayor of London ordered householders to hang out lanthornes on winter evenings from All Hallows to Candlemas. In Liverpool attempts began following a council minute dated 1653, ordering two lanthornes with two candles burning overnight in "Ye dark moon" to be set out at the High Cross and Whyte Cross. Probably one of the first instances of technical application in the street lighting field was that introduced by a gentleman named Hemig, who in 1694 patented a reflector which partially surrounded the open flame of a whale oil lamp possessing a hole in the top which aided ventilation.

For many years street lighting was approached in much the same way as the lighting of interiors, where the main criterion was that of the measured illumination on the working plain. In the case of street lighting it soon became obvious that the problem was rather more complicated because of the comparatively long spacing and low mounting



*Sir Lawrence Bragg presenting the fourth Trotter-Paterson Memorial Lecture to the IES at the Royal Institution on February 11. A report of the lecture is given on page 70.*

heights of the light sources. This led to the first milestone in technical development, British Standard Specification 307 of 1927. In this specification highway lighting installations were grouped into eight classes and specified minimum mounting heights, maximum spacing height ratios and minimum rated mean test points of illumination were given. Great attention, and indeed the odd lantern, too, was focused on this "test point" with the general result that the specification, and its revision in 1931, was in effect disappointing.

While all this thought was being given to the art of street lighting there were tremendous developments in the production of artificial light sources. The advent of discharge lamps in 1932 was the next major development. Mr. Smith showed slides of modern street lighting, showing fluorescent cold cathode and sodium installations.

A lively discussion followed, with many visitors and members taking part. A vote of thanks to the speaker was proposed by Mr. W. F. G. Dean.

### Nottingham Centre

At the Nottingham Centre meeting on January 3, Mr. J. S. McCulloch, a vice-president of the Society, delivered his lecture on "Lighting of Standard Factories on Trading Estates." The talk covered the planning and layout of the standard factory as erected on the north-east coast development areas. The flexibility of the installation demonstrated the care and thought which had obviously been given to this problem. The economics of maintenance leaned heavily in favour of a fluorescent installation, but the audience was interested to hear that the majority of these factories are, in fact, illuminated with tungsten lamps, mainly in view of the lower capital outlay required for the initial installation, as all lighting equipment is the property of the tenant.

The thirty-five members and friends present participated in a lively discussion. A vote of thanks on behalf of the Society was proposed by Mr. D. R. M. Hornsey.

## FORTHCOMING EVENTS

### LONDON

**March 12th**

Sessional Meeting. "Visibility on the Road," by A. J. Harris. (At the Federation of British Industries, 21, Tothill Street, S.W.1.) 6 p.m.

**April 2nd**

**Annual Dinner and Dance.** (At the Café Royal, Regent Street, W.1.)

### CENTRES AND GROUPS

**March 6th**

EDINBURGH.—"Lighting and Production," by J. W. Howell. (At the Y.M.C.A., 14, St. Andrew Street, Edinburgh.) 6.15 p.m.

SWANSEA.—"Lighting for Photography," by R. W. Unwin. (Joint meeting with the Swansea and Mumbles Camera Club.) (At the Demonstration Theatre of the South Wales Electricity Board, The Kingsway, Swansea.) 6.30 p.m.

**March 7th**

CARDIFF.—"Lighting for Photography," by R. W. Unwin. (At the South Wales Electricity Board's Demonstration Theatre, The Hayes, Cardiff.) 7 p.m.

GLASGOW.—"Lighting and Production," by J. W. Howell. (At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m.

NOTTINGHAM.—"Lighting Considered as a Basis for Design," by D. Phillips. (At the Electricity Service Centre, Smithy Row, Nottingham.) 5.30 for 6 p.m.

**March 8th**

NOTTINGHAM.—Annual Ladies' Evening. (At the Welbeck Hotel, Nottingham.)

**March 11th**

SHEFFIELD.—"Light and Vision," by H. Moore. (At the Medical Library, The University, Western Bank, Sheffield, 10.) 6.30 p.m.

**March 12th**

BATH AND BRISTOL.—"A Critical Analysis of Lighting Equipment and its Maintenance," by J. Mortimer Hawkins and C. J. Veness. (Joint meeting with E.C.A., Bristol.) (At the Royal Hotel, Bristol.) 3 p.m.

**March 15th**

LEEDS.—Annual General Meeting and Members' Discussion. (At the Yorkshire Electricity Board Lecture Theatre, Ferensway, Hull.) 7 p.m.

**March 20th**

NORTH LANCASHIRE.—Annual General Meeting. "Recent Developments in Lighting Technique," by J. Jansen. (At the Demonstration Theatre, The North Western Electricity Board, 19, Friargate, Preston.) 7.15 p.m.

TEES-SIDE.—"Town Planning and Lighting Problems," by J. Worthington. (At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.) 6.30 p.m.

**March 21st**

MANCHESTER.—"Recent Developments in Lighting Technique," by J. Jansen. (At the Demonstration Theatre of the North Western Electricity Board, Town Hall, Manchester.) 6 p.m.

**March 22nd**

BIRMINGHAM.—"Street Lighting from a City Engineer's Point of View," by Granville Berry. (At "Regent House," St. Philip's Place, Colmore Row, Birmingham.) 6 p.m.

**March 25th**

LEEDS.—Annual General Meeting and Film. (At the E.L.M.A. Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 6.15 p.m.

LEICESTER.—Film Show. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 6 p.m.

**March 29th**

BATH AND BRISTOL.—Dinner Dance. (At the Hawthorns Hotel, Bristol.)

**May 3rd and 4th**

**Week-end meeting of Edinburgh, Glasgow and Newcastle Centres at Peebles Hotel Hydro, Peebles.**

# Book Reviews

*"Planned Artificial Lighting," by John W. T. Walsh, O.B.E., M.A., D.Sc., M.I.E.E., published by Odhams Press Ltd. Pp. 192 with 78 line drawings and 52 photographs. Price 25s.*

In his usual lucid and pleasant manner, Dr. Walsh deals in this book with the fundamentals of artificial lighting. Application of light is kept constantly before the reader, for although inevitably the first half of the volume is devoted for the most part to lamps and lighting equipment, there is constant reference to the way in which this apparatus is to be used.

The book is divided into four sections. In the first, dealing with Lighting Requirements, is a brief discussion of the "Value of Illumination Needed," "The Kinds of Lighting Needed" and "Task Analysis." Part II discusses Lighting Equipment, dealing with lamps and fittings, including fittings designed for special purposes, and Part III, Lighting Design, concerns itself with the principal techniques and problems, illustrated well by references to actual installations. Included here is a chapter on Decoration and Maintenance, which, as the author says, "might be considered inappropriate in a book on the design of lighting systems, but, in fact, suitable internal decoration and efficient maintenance are so vital to the success of a lighting scheme that to omit any mention of them would be unjustifiable."

Part IV is entitled Special Problems in Lighting, and includes lighting for inspection, for display, for hazardous situations, street lighting, flood-lighting and decorative lighting. None of these falls comfortably into the general framework of recommendations given in the earlier part of the book, but they nevertheless should be studied because from them will often come helpful ideas. It is very common in lighting for the most unlikely techniques in one type of application to be useful in another.

It is no easy matter to select and compress the mass of information on lighting and the many conflicting ideas into a slim volume, and inevitably some of one's pet themes are bound to be missing, for example, in the discussion on the value of illumination it might be worth while adding to the fundamental data on acuity and visual performance which is quoted some of the results in factories where productivity has been shown to increase with improved lighting, for although the results of such experiments can hardly be strictly accurate, the trend is unmistakable. Again, the illustration of football floodlighting shows a side mounted scheme, whereas lighting from high towers is now regarded as the preferred system.

But these are only quibbles; the book will be found valuable to lighting engineers, particularly those who are relatively new to the job and to many others who have to instal lighting and who want guidance or even ammunition with which to argue with the expert. One word of warning, and this from Dr. Walsh himself in the Introduction: a knowledge of general principles is indispensable and will usually obviate the worst mistakes, but beyond this it is imperative to have practice and experience. W. R. S.

*"Strassenbeleuchtung" (Street Lighting), by W. Strahringer, published by Verlags und Wirtschaftsgesellschaft der Elektrizitätswerke, Frankfurt/Main, pp. 162, with 7 drawings and numerous tables and graphs, stiff paper cover.* Price DM 12. (21s.). *In German.*

Without the accompanying sub-title, "A Study in energy economics," the title of this book is quite misleading. The principles and technicalities of street lighting are scarcely mentioned; the work is a most painstaking treatise on the costing of street lighting installations of all kinds, including gas installations, which are probably more important in Germany than in most other countries, as far as new work is concerned.

The treatment is clear and is based on the author's practical experience As he points out, conditions are so variable that it is impossible to lay down hard and fast rules. The underlying principles for costing an installation can, however, be indicated and the work of the public lighting engineer who has to compare the costs of alternative schemes can be, to a large extent, systematised and made simpler by following the lines laid down. Nevertheless, it is somewhat doubtful whether the public lighting engineer in this country, unless he reads German easily, will be tempted to abandon his own methods for those expounded by the author.

J. W. T. W.

# Situations

## Vacant

Ekco-Ensign Electric Ltd. have vacancy in their London Office for LIGHTING ENGINEER. He should be well educated and conversant with modern lighting methods. Apply Senior Lighting Engineer, 45, Essex Street, W.C.2.

Thorn Electrical Industries Limited require a LIGHTING SALES ENGINEER with drive and initiative to operate in the London Area. The successful candidate will be required to deal with architects and consulting engineers, and in addition to a good knowledge of lighting technique, some knowledge of building construction and practical electrical experience would be an advantage. Good prospects for advancement. Staff Pensions Scheme and Free Life Assurance. Write giving details of age, qualifications and experience to Staff Manager, Thorn Electrical Industries Limited, 233, Shaftesbury Avenue, W.C.2.

DRAUGHTSMAN required for interesting work in Lighting Fittings Design Office. Write stating age, salary required and full details of experience, etc., to Box 930.

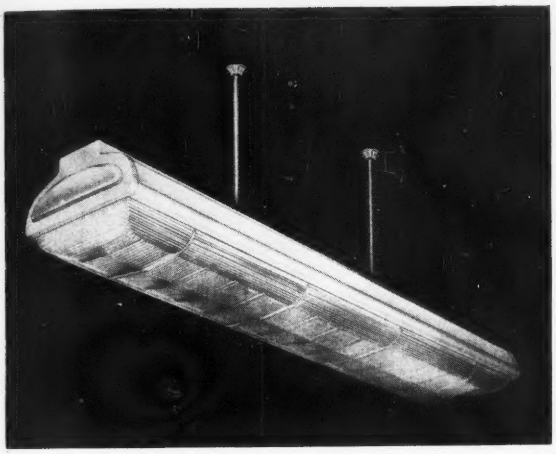
## Wanted

Contemporary minded LIGHTING ENGINEER (29), I.E.S. member, seeks interesting responsible position. Resident Cardiff area. Experienced in discussing schemes with architects, consultants, etc. Apply Box No. 931.

# NEW PRODUCTS

## "Holoflux" optical louvre

A new optical louvre, "Holoflux," for scientific control of tubular fluorescent light sources, has been introduced by Holophane Ltd. They have developed a unique system of conical prisms which form a pleasing pattern in light-controlling plates of high durability. The makers claim that an extremely efficient control of light is obtainable from these prismatic panels providing low levels of source brightness with high utilisation. The prismatic patterns are not merely light diffusers but they have a very practical purpose as they



restrict the majority of emitted light to angles within 45 deg. of the downward vertical. The luminance or photometric brightness of the fitting is therefore greatly reduced when viewed from angles within 40 deg. of the horizontal. The prismatic panels thus act as optical louvres, having all the features of a small-mesh louvre system with the added advantage of an enclosed fitting.

The "Holoflux" commercial range provides for pendant, close-ceiling, and recessed fittings in the following lamp sizes: Two x 40-watt MCF/U (4 ft.) and two or three x 80-watt MCF/U (5 ft.). Standard finish of metalwork is stove enamelled ivory. The fittings are supplied with instant start gear and include wiring circuit for lamps (no lamps supplied) operating on normal A.C. voltages.

## Flush mounting frames

The latest addition to Crompton's "New-Range" lighting fitting components is a flush mounting frame designed to enable all standard industrial-type "New-Range" fittings, for 5-ft., 4-ft., 3-ft. and 2-ft. fluorescent tubular lamps, to be recessed into false ceilings. It is intended primarily for use with lighting fittings suspended by rod, conduit, or directly mounted. Louvred or open-type reflectors can be used with all sizes of frame and dished diffusers can be used with the 5-ft. frames. No external screws are necessary to secure the frame in position. It is first attached to the closed end plates of the fitting, and the whole assembly is drawn into position by means of the suspension arrangement, e.g., by the use of locknuts on the threaded conduit. The advantage of this method is that the false ceiling does not have to support the weight of the fitting or even the frame. Because of its wide rigid rim, the frame fits neatly to ceiling surfaces and allows for reasonable cutting tolerances of the ceiling aperture.

## New contemporary design lighting fittings

The public's growing interest in the modern movement in design is reflected in the latest contemporary lighting fittings announced by the G.E.C. One group of fittings follows a vogue very popular on the Continent and uses 25-watt and 40-watt small round lamps, 50 mm. in diameter. The combination of the glitter of the many low brightness lamps with the elegant lines of the metal-work make it a most attractive series. The metal-work of polished brass is so constructed that each arm is locked accurately in position and cannot be turned out of alignment when the fitting is cleaned. The range comprises pendants either for large or small rooms, together with matching brackets, and a ceiling-mounting version for low rooms. In all patterns a frosted candle lamp may be used if this is preferred to the spherical bulb.

Another series consists of basic designs of metal-work for pendants and wall brackets with a choice of contemporary strongly-coloured cardboard shades or decorated glass in quieter tones. There is a substantial group of units for hanging on long thin flexible either singly or in a cluster at different heights.

Many houses are being built with rooms having low ceilings, and for these there is a group of six new ceiling fittings.

Several special-purpose brackets have been developed so that people may improve their lighting with bracket fittings without incurring the expense of installation work. They are fixed merely by a picture nail, and might be termed "pin up" fittings. The flexible is led to the nearest plug point. Also included are four outside wall brackets to grace the outside of any house or small entrance way. All are fully weatherproof.

## Coloured spotlight

An almost invisible source of decorative gold, red, blue, or "complexion pink" light is provided by a coloured aluminium spotlight reflector announced by Curtis Lighting, of Chicago. The reflector is made for the firm's "Vari-Spot" recessed adjustable down-light. Used with a silvered-bowl 100-watt white lamp, it casts soft illumination whose source is almost entirely concealed at normal viewing angles.

## Industrial fitting

Simplex Electric Co., Ltd. have produced the "Endura" 5-ft. 80-watt fluorescent fitting completely sheathed in white P.V.C. with all metal parts fully protected with plastic or heat resisting rubber to ensure that corrosion will not take place. It is ideally suited for industrial atmospheres with special application in chemical plants, dye houses, laundries, abattoirs, etc. The fitting is "quickstart" and is guaranteed against electrical failure for a period of two years. Reflectors are available in rigid white P.V.C. or opal "Perspex." Prices £8 17s. 6d. to £13 17s. 6d. each.

## Rotary switch

Austinlite Ltd., of Crawley, Sussex, announce the introduction of a new rotary switch, the type A.15, which is an extension of their existing range. It is a compact multi-cell switch, which can be assembled to provide many hundreds of different contact combinations. It embodies all of the exclusive features of the larger switches in the Austinlite range, and in spite of its compactness, the switch is liberally rated at 15 amps. 250 volts, or alternatively, 7½ amps. 440 volts. Also, it is suitable for direct-on-line starting of three phase induction motors up to 5 h.p.

## Corrugated glass reinforced sheeting

In addition to their range of translucent corrugated glass reinforced sheeting Thermo-Plastics Ltd., Luton Road Works, Dunstable, have now introduced a line of translucent or opaque reeded sheeting produced from the same material It is supplied in a coloured decorative finish, and is already finding wide use for panelling and translucent ceilings, outdoor loggias, etc.

# POSTSCRIPT By "Lumeritas"

THE REMARKABLE variety of street lighting in London, and its effects, was the theme of a recent leader in London's *Evening Standard.* On almost any journey through the Metropolis every variety is encountered and this means five different illuminants—to say nothing of other differences. For example, said the leader-writer, during a drive from Piccadilly to Streatham—a distance of six miles—" a bewildering series of changes takes place . . . the continual sudden variation is disastrously disturbing to vision and, instead of being safer, the roads are more dangerous." The critic is quite reasonable however; he realises that the present " patchwork " is the result of a praiseworthy effort by some local authorities recently to improve main road lighting. The alternation of new with not so new, and not so good, lighting on London's many miles of traffic routes is likely to be with us for quite a time yet, if only for financial reasons. But the *Evening Standard's* plea is that " local authorities should forthwith get together and decide on an overall unified plan for London " so that, as and when the older parts of the patchwork can be replaced, the new installations should be of a standard type and performance. Undoubtedly the present differences in lighting on traffic routes should be diminished as soon as possible but, unless we believe that finality has been reached in the design of street lighting, there should be no insistence upon strict uniformity.

PROTESTS have been made about outdoor lighting—or rather its appurtenances—in another field. It appears that residents in the neighbourhood of Chelsea football ground resent, as " unsightly," the 170 ft. steel pylons which have been erected for floodlighting the playing field. As these pylons have been erected with the permission of the local planning authority it is not very likely that protests now will be of any avail. The height of the pylons is considered necessary to ensure that light reaches the ground at suitable angles of incidence. Football fans—and they seem to be very numerous—are unlikely to disapprove of these giant " lamp-posts " even if they happen to live in the shadow of the giants; but it is just as well for the feelings of others that professional football fields are not very thickly crowded together. Controversy still rages about those comparatively dwarfish lamp-posts of concrete which are becoming ubiquitous in our streets. I read that, rather than have them in a street of Georgian houses in a Surrey town, the existing gas lamp-posts (themselves not of the Georgian period !) are to be converted for the installation of electric lamps.

WE ARE now very familiar with linear light sources, including discharge tubes which can be bent to any desired shape and so be " tailored " to a given contour, but it may not be generally known that such a light source was actually in use 50 years ago. The first issue of this journal contained a contribution by Dr. J. A. Fleming, F.R.S., dealing with the Moore tube, which was available in lengths of up to 200 ft. Among the places lighted by this means was the forecourt of the Savoy Hotel in London. Here, a length of 176 ft. of the tube, bent into the form of a rectangle 60 ft. by 24 ft., was suspended 17 ft. above ground level. This provided a practically uniform illumination of 1 lm/ft$^2$ over an area of more than 4,000 sq. ft. The gas filling the tube was carbon dioxide, and the light emitted was said to be of " daylight " quality. Very little heat was produced, but the luminous efficiency of the light source was very low, being only about 7 lm./w. Nevertheless, it was a more efficient source than were the incandescent filament electric lamps of the period. At the time, quite a number of shops and other interiors in the U.S.A. were illuminated by tailored luminous Moore tubes.

THE FLOODLIGHTING of buildings, which was specially featured in this country back in 1931, when the International Illumination Congress was held here, seems also to have been practised first 50 years ago. In 1908 the *Electrical World* published an illustrated account of the lighting of the tower of the Singer Building in New York, which was accomplished not only by the use of a large number of small lamps—such as were used for " outline-lighting "—but by more than 25 " searchlights " used " to wash with light wide tracts of area that could not easily be effectually treated otherwise." The special searchlights were located on the roofs of the buildings at the base of the tower and they were equipped with shutters so as " to restrict the light to the space occupied by the tower and cause it to stand out against a dark background." The effect was certainly very impressive, and it is no wonder that the floodlighting of buildings has since become more widely practised, although much more of it is still to be desired.

WHILE RECALLING past events, I may mention that immediately prior to the foundation of the IES in 1909 Mr. Leon Gaster delivered a series of four Cantor Lectures before the Royal Society of Arts " dealing with the latest developments of the different illuminants and the science and art of illuminating engineering." While the present issue of this journal has been going through the press, another series of Cantor Lectures has been in progress dealing with " the contribution of lighting to modern life." The lecturers are three well-known Fellows of the IES. It is, of course, coincidence that both the earlier and the present Cantor Lectures on lighting should be given at " historic moments "; the first series at the end of the gestation period of the Society, and the present series at the end of the gestation period of a new constitution for the Society. Need I draw attention to the word " lighting " which occurs in the titles of all three of the latest lectures ?

TAILPIECE, from the *Daily Telegraph.* " Three mid-fifteenth-century French illuminated manuscripts were sold in Paris. . . . The 47 illuminations provide interesting evidence on fifteenth-century costume," but, of course, no evidence on fifteenth-century lighting !

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